

CRANFIELD UNIVERSITY

Sandra Linneck

An Ethnographic Approach to Understanding Preferences for Water
Supply and Treatment in Rural India

School of Energy, Environment and Agrifood

MSc by Research
Academic Years: 2014 - 2016

Supervisor: Alison Parker

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ABSTRACT

Increasing water scarcity and contamination pose a danger to the health of a considerable number of the world's population. Decisions regarding water supply and treatment are usually made in a top-down fashion. The end-users, however, still react to these decisions and the provided water facilities and treatment options. These reactions include the rejection of certain water supplies or treatment options and own provisions for a supply with safe and sufficient drinking water. This study investigates the socio-cultural and economic factors which influence the rural Indian population's preferences regarding their water supply and treatment. The study has been carried out, employing an ethnographic approach to the field, in two villages in Karnataka, in South India, conducting 18 in depth, problem-centred interviews, participant observation, and two group discussions. The key findings show a ubiquitous lack of education regarding water and related hygiene-measures, water policies and water contamination. This led to uninformed opinions about water supplies and treatment. Socio-cultural factors, along with pragmatic factors such as reliability of water supply and treatment, along with the physical ease of use regarding their operation, were found to be more important for the villagers' preferences than economic factors. Most households viewed piped water supply as an unreliable source of water, also in terms of water quality. The households and NGO interviewees favoured individual community-based solutions on village level, whereas the political decision-makers were in favour of centralised solutions, usually through piped supply. These findings show a need for long-term, in-depth studies of individual socio-cultural factors and the importance of decentralised and individually fitted water supply and treatment solutions. The fact that perceptions of water supplies and treatment, based on similar concepts could be found in two villages, in entirely differing regions in South India, suggests the significance of these findings beyond Karnataka and the Indian borders.

Keywords: Water supply, participant observation, community-based approach, religious beliefs and water

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LIST OF ABBREVIATIONS

GP	Gram(a) Panchayat - 'self-government', lowest level of government - usually for one village
GLR	Ground-Level Reservoir
H1	Household 1 (Guest household and first interview participant household of study in V1)
H2	Household 2 (Second interview participant household of study in V1)
H3	Household 3 (third interview participant household of study in V1)
H4	Household 4 (fourth interview participant household of study in V2)
H5	Household 5 (fifth interview participant household of study in V2)
lpcd	litre per capita per day
OBC	Other Backward Castes
OHT	Over-Head (water) Tank
POU	Point Of Use
SC	Scheduled Caste (one lower caste within the former Indian caste system)
ST	Scheduled Tribe - one of the lowest groups within Indian society, usually living in rural areas
TP	Taluk(a) Panchayat - second lowest government level, a taluk includes several villages and is a subdivision of a district, usually combined to a taluk for revenue reasons
UNICEF	United Nations Children's Emergency Fund
V1	Village 1 (study village in Shimoga district)
V2	Village 2 (study village in Kalaburagi district)
ZP	Zilla Panchayat - district government, including all villages and towns within a government district
WHO	World Health Organization

1 Introduction

The world's population is steadily increasing, which at the same time means an increase in the demand for water. Socially and politically driven interests in water resources and resulting conflicts exacerbate the situation. Climate change is additionally challenging the decision-leaders of water management, and has led to an intensifying occurrence of extreme weather events, such as floods, storms and droughts. Although significant progress has been made towards the improvement of the water situation and access to fresh water worldwide, since the introduction of the Millennium Development Goals, the United Nations Children's Emergency Fund (UNICEF) and the World Health Organization (WHO) still underline that these improvements have been made in an uneven way across groups of different status and vulnerability (UNICEF and WHO, 2014).

India is a sub-continent with various and ubiquitous water problems. These problems concern both the quantity, as well as the quality of the water available. Within the different states and districts, which are as diverse as India is in itself, the extent and exact type of these water problems vary. At the same time many similarities in water problems in different regions can still be found. On the matter related to the difficulty of providing enough water for the domestic, agricultural and industrial sector in general, India's rapid economic and continuous demographic growth is the central problem faced by the Indian government. Climate change and fights over water sources exacerbate the situation. This has led to depleting groundwater levels. Surface water and groundwater are often contaminated and need treatment before being fit for drinking (UNICEF et al., 2013).

1.1 Water Scarcity and Quality in India

India's demand for water is rapidly and steadily increasing with its economic and demographic growth. At the same time, water scarcity is a challenge for India's industrial, agricultural and domestic sector (Figure 1).

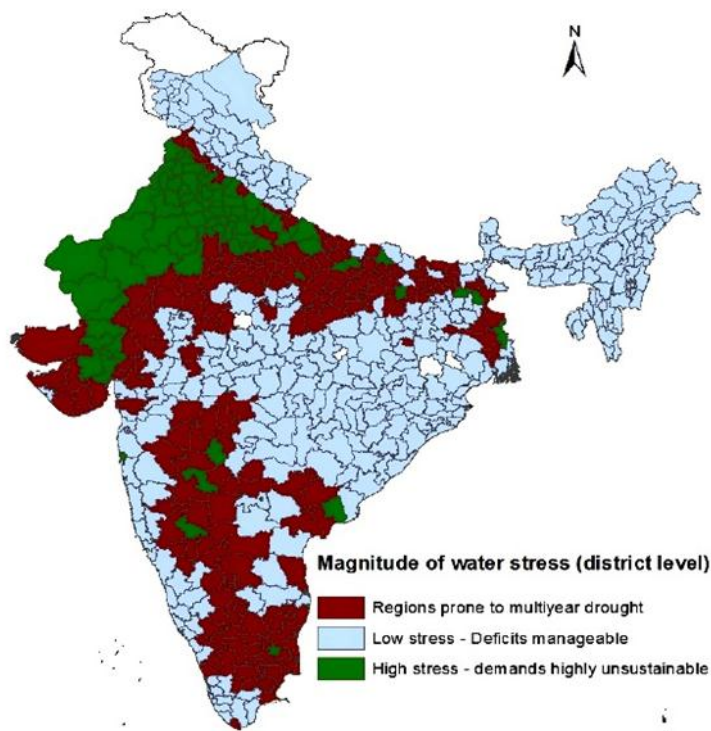


Figure 1 Spatial distribution of the magnitude of water stress at the district level in India (Perveen et al., 2012)

This problem of water scarcity can be temporary during drought times or permanent throughout the whole year (Perveen et al., 2012). In permanently drought-prone parts of India, agriculture without irrigation is practised (UNICEF and WHO, 2014).

India's population is growing constantly, however, the provision of sufficient and safe drinking water poses a challenge for the country. Currently, a lack of safe water, inadequate sanitation facilities, and poor hygiene practises are amongst the major causes of illnesses in India (UNICEF et al., 2013). The World Health Organization estimates that about 10 million illnesses and 700,000 deaths in India could be attributed to diarrhoea. This figure includes 400,000 children under the age of five (PCI, 2002; WHO, 2002). Further estimates show that waterborne diseases affect around 37.7 million Indians annually. 1.5 million children die of diarrhoea. 73 million working days are lost due to waterborne diseases each year which poses a problem for the productivity of India's population on the economic

level and as such affects the monetary situation of day labourers who seek work on a day to day basis in particular (e.g. on farms or building sites) in order to secure their income (Figure 2) (Ruet, 2002; Mukadam, 2009).

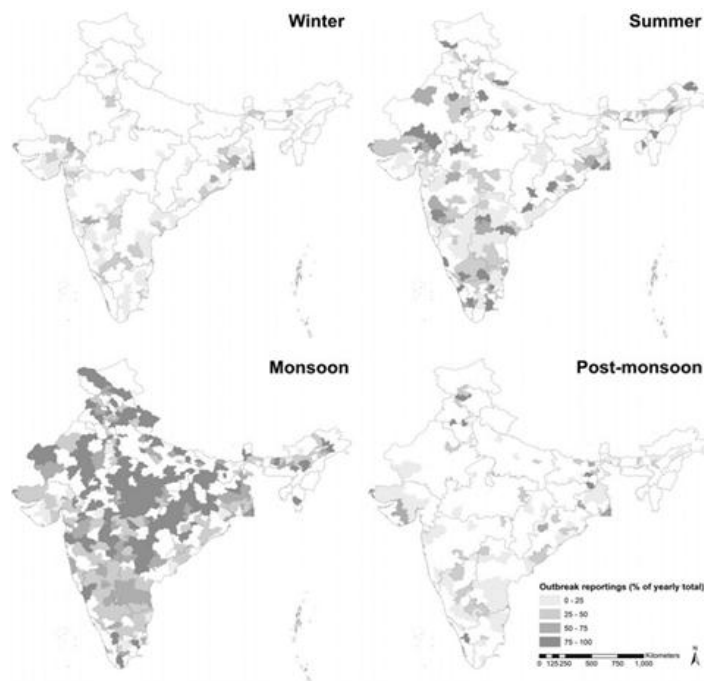


Figure 2 Relative number of acute cases of diarrhoeal disease outbreaks (waterborne) reported in different seasons in India (Perveen et al. 2012)

The problem of chemical contamination is also prevalent in India. The major chemical parameters of concern are fluoride and arsenic. Water samples indicate that iron is also emerging as a major problem (Khurana and Sen, 2008). Moreover, due to over-exploitation of groundwater, the levels of mineral contaminants, such as arsenic and fluoride in water, have increased significantly. High levels of arsenic in drinking water can cause nervous dysfunction, various types of cancer, and hyperkeratosis of the palms and feet. Consumption of water containing high levels of fluoride causes skeletal as well as dental fluorosis, skeletal fluorosis being visible in form of deformations in adults and children. Millions are presently affected by arsenic poisoning, for example in Rajasthan,

Gujarat, and Andhra Pradesh (EMPRI, 2012). Across the country, there is an urgent need for the implementation of technologies to remove microbiological, arsenic and fluoride contamination from drinking water before it is consumed. The World Health Organization estimated that hygiene interventions including hygiene education and promotion of hand washing could reduce cases of diarrhoeal diseases by up to 45%, whilst adding that improvements in drinking water quality through water treatment, such as chlorination at household level, could reduce diarrhoea by up to 39% (WHO, 2004).

1.2 The Government's Responsibility Regarding Water Supply and Treatment

There are numerous government policies and schemes regarding water and sanitation in India and its different states (IELRC, 2014). The government of Karnataka's approach is to provide their rural citizens with a minimum amount of water per citizen, which is 40 lpcd (litre per capita per day). The responsibilities for funding, decision-making and infrastructure planning lie at district, state and central government level. At the lowest level, the Gram Panchayat (GP) - which is the lowest government entity on village level - is responsible for smaller maintenance and repair works, whereas all other water-related issues have to be reported to the higher level of either district - Zilla Panchayat (ZP) - or State government. In some cases, and at the level in-between GP and ZP, called the Taluk Panchayat (TP), engineers become involved in the reporting and maintenance process as well. Depending on the case, it will be reported from ZP level further to the state government (DoDWS, 2010). Money is released from the top to the bottom institution, usually passing each of the government levels in between as well. The Zilla Panchayat is usually directly responsible for the implementation of new water infrastructure in Gram Panchayat areas. Some of the funding for this is released to lower levels by the central national government, whereas every state government is ascribed a certain amount of money for water infrastructure and maintenance by the beginning of each financial year (ibid.).

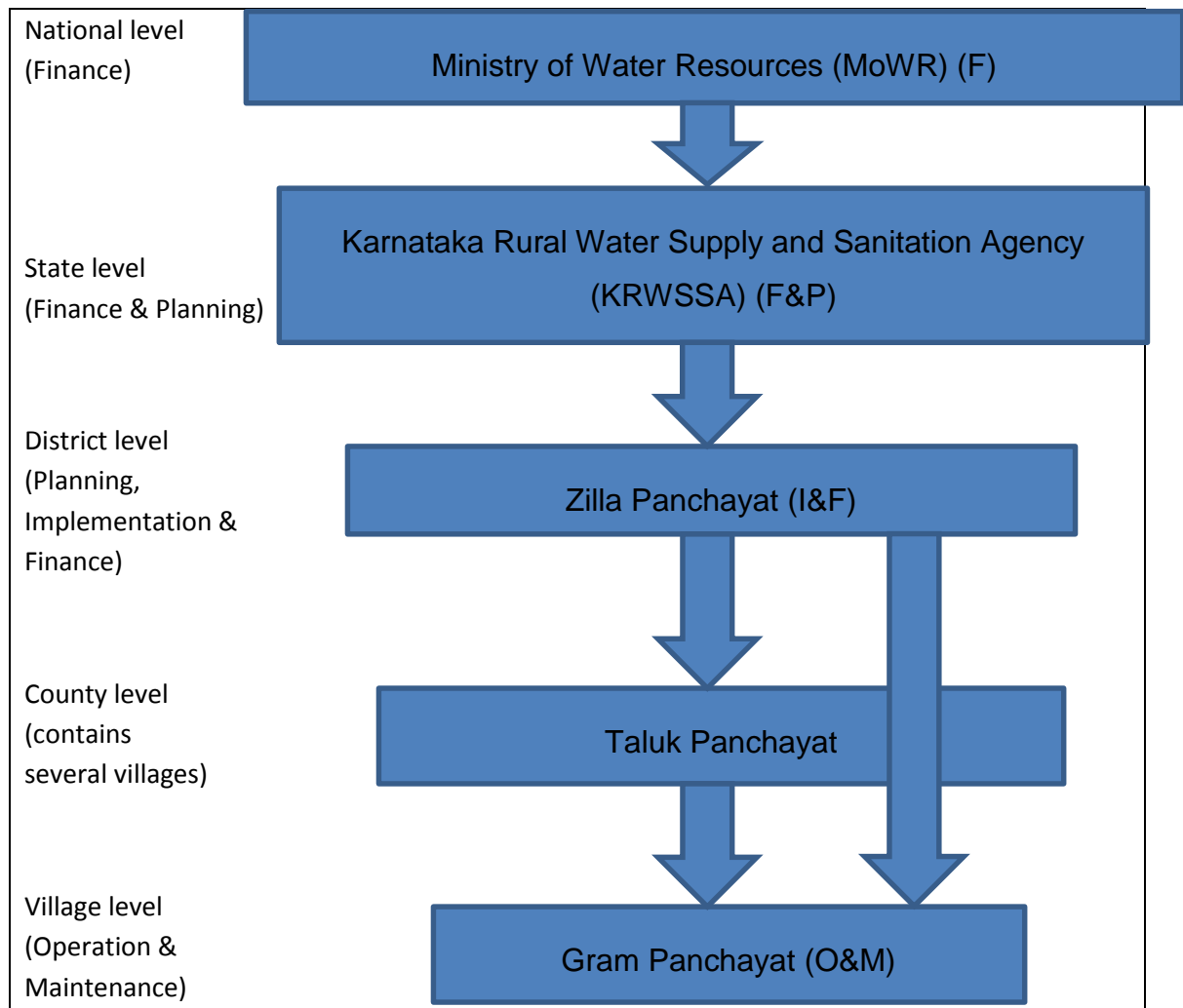


Figure 3 State Responsibilities for water supply and water infrastructure in Karnataka, India

Although the responsibility for water supply in India lies with the government, contracts are given more and more to private constructors and private companies. Public-private partnerships in the water sector can be problematic, if they are driven mainly by monetary interests (ibid.; Narsiah and Ahmed, 2012). The most important water programme in India is the 'Rajiv Gandhi National Drinking Water Mission', since it is the national rural drinking water programme. The overall goal, as formulated in its programme, is "to provide every rural person with adequate safe water for drinking, cooking and other domestic basic needs on a sustainable basis. This basic requirement should meet minimum water quality standards and be readily and conveniently accessible at all times and in

all situations.” The programme also states water as “a public good, and every person has the right to demand drinking water” (DoDWS, 2010). In India, the provision of clean drinking water is also enshrined in the Constitution of India. Article 47 confers the duty of providing clean drinking water and improving public health standards to the government. Mall et al. (2006) estimate the Indian government’s efforts to provide safe and sufficient water at \$ 600 million a year. However, these efforts do not seem to be sufficient to tackle this challenge, as beside the government, parastatal organisations in particular, NGO’s and private companies are launching programmes and projects to help improve the water situation. With all these different parties involved, additional problems occur on a regular basis with projects, decisions and implementations conflicting and interfering with each other. This complex situation is further aggravated by often profit-oriented approaches of these parties (Conin et al., 2014). The costs for operation and maintenance of water infrastructure are usually not covered by the water tax - which is the monthly lump sum rural households pay for their total domestic water consumption - but come in form of subsidies from the central or state government or the housing tax (DoDWS, 2010).

The water situation in India is aggravated by the lack of infrastructure and maintenance causing leakage, and hence water wastage (Conin et al., 2014). Despite this situation, decisions about policies and water schemes are mainly made on a centralised state-level, which is only slowly and partly changing. Water is often pumped over long distances from central dams and rivers (Arghyam, 2009). However, efforts are being invested by government agencies and NGOs to encourage local Indian communities to adopt community management and community participation approaches in their water supply strategies. The goal is to bring knowledge about water supply and safety to the communities and to empower the community members to engage in solutions for water supply at village level. This could be a desirable bottom-up approach, but as reported by ASHWAS, most of these approaches only existed on paper when the particular sites were visited (Arghyam, 2009; James, 2011).

Although social aspects of technology use are regarded as important for WASH projects, there is still a lack of research regarding these aspects on the particular site before and after the installation of technologies (Chambers, 1995; Honkalaskar et al., 2014). Social aspects are embedded and intertwined with the cultural context which individuals and groups are acting within. Therefore, this study has been carried out, using an ethnographic approach in two villages in Karnataka, in India, which allowed for an in-depth insight into the social fabric of the rural study sites. The findings of this research are, in their consequences brought into a wider scope, outlining the necessity of in-depth social research for the field of rural water supply, also with respect to recommendations for stakeholders working and acting within this context.

1.3 Research Aim, Objectives and Research Question

The **aim** of this research is:

To identify the preferences for water sources and treatment of the population in the two villages in rural Karnataka, India, and the socio-cultural and economic factors influencing these choices by looking at these, embedded into the cultural context of the field and drawing wider implications for the academic field and practice from the findings.

Therefore, the **objectives** of this research are to:

- 1) Identify important socio-cultural and economic aspects which lead to decisions for or against certain water supplies and treatment options.
- 2) Understand the local living conditions and daily processes around drinking water (e.g. water collection, water use).
- 3) Understand the meaning water has for stakeholders in the targeted villages.

- 4) Find out which types of water supply and treatment the villagers trust and why.

Consequently, the **research questions** of this research are:

1. Why does the local population use the water supplies and treatment methods they use?
2. Which socio-cultural and economic factors influence the local population's perception regarding their water supplies and treatment methods?

1.4 Structure of the Thesis

The thesis is structured as the following: Introduction (1), Literature review (2), Methodology (3), Results (4), Discussion (5), and Limitations, Conclusion and Recommendations (6). The introduction provides a thematic access to the topic in general, including the presentation of the research aim, objectives and research question, as well as a description of the thesis's structure. In the methodology chapter, the research methods and the reasons for their specific choice are defined. This is followed by the presentation of the results of the research. These results are then critically discussed and linked to the research aim and objectives, as presented in the introduction, and also in relation with the findings of the literature review chapter. Finally, in the first part of the conclusion, the limitations of the research are presented. In the second part of the conclusion, the researcher, based on the considerations of the previous chapter, concludes and answers the research questions, and also gives recommendations for further research projects in this thematic field, outlining the consequences to be drawn from the outcome of this research. The appendix is attached after the last chapter and the references, and includes the interview script.

2 Literature Review

In this chapter, the findings from the relevant literature on the social, cultural and economic aspects of water supply and treatment are presented. Initially, a brief definition of the term 'socio-cultural' and in this context culture, social, and economic aspects will be given to set a clear frame for the research. There is a clear lack of studies and literature which examine the motivations for decision-making processes related to water sources and treatment, based on socio-cultural reason. Regarding the population's perception and preferences of their water supply, all literature found, solely addresses economic aspects, particularly the local population's ability to pay and ways for obtaining more economical efficiency of water supply (World Bank 2008a).

2.1 Setting the Frame for the Research

In order to explain the term 'socio-cultural', its two components 'cultural' and 'social' will be specified first, as 'socio-culture' is defined as a "combination of social and cultural factors" (Oxford Dictionary, 2016). Hence, the term 'cultural' will be examined along with the other key terms 'economic' and 'social' here. 'Culture' has been described as the world's third most complex term, which underlines the difficulty to clearly and universally define it (Schmid, 1992; Eagleton, 2000). 'Culture' is often used as a vague term for loose concepts and the term itself, therefore, can have different meanings (Smesler, 1992). Accordingly, only a short description of selected definitions of the term can be presented here.

Eagleton (2000) views the starting point and roots of the definition of 'culture' in colonialism and anthropology as being used in an empirical power-based context to carry out research on colonies. The definition of 'culture' given by Tylor, an English 19th century anthropologist in the Encyclopaedia Britannica, is as follows: "[...] that complex whole which includes knowledge, belief, art morals, laws, custom and any other capabilities and habits acquired by man as a member of society" (Encyclopaedia Britannica, 2000). Kroeber and Kluckhohn (1952) give a

similar definition but include the transmission through symbols in the process of learning and inhabiting culture and passing it further to other members of the group. Adler (1997) adds that culture manifests itself within the members of the same social group, and is passed on to younger members of the group by the older members. He sees culture as essential for shaping a person's perception of the world, as well as his/her own behaviour (Adler, 1997). Kroeber and Kluckhohn also describe the existence of a meta-culture in this context. With this term, they refer to the culture of a society which, as they say, is a combination of several cultures of the various groups within a particular society (Kroeber and Kluckhohn, 1952). Hall (1952) as well as Hofstede (1991) and Dahl (2004), see cultures also as constituting themselves in contrast to each other, through their differences. Hall (1984) describes culture in this context as subconscious processes, which a person only becomes aware of consciously when he/she is confronted with other cultures which differ from his/her own culture.

'Culture', in this research will be defined as a dynamic system of social behaviour, patterns, perceptions and attitudes a person has learnt, embraced, and which he/she uses for interaction within his/her own social group and social environment and the objects among these, as well as in interacting with individuals, groups and objects outside of his/her own group.

Social aspects, in the context of the research's aim and objectives are defined following Max Weber's definition of social action: "Action is social in so far as, by virtue of the subjective meaning attached to it by the acting individual (or individuals) it takes account of the behaviour of others and is thereby oriented in its course." (Weber, 1947).

Both – social and cultural aspects of water supply will be examined in one category under socio-cultural aspects. The reason for this is the overlapping of these two categories in many aspects. Culture is displayed through social actions and practises. Referring to the two definitions of 'social' and 'cultural' above, the social aspects cannot be seen as isolated from cultural aspects. Social aspects are always a part of culture (MacIver and Page, 1949).

‘Economic’ in this research refers to the monetary situation of the people, and here largely to the money that is available to be spent rather than assets such as houses, etc. but not excluding these. This seems to be reasonable since installation costs have to be paid for setup and maintenance of water supply and treatment facilities.

2.2 Social Acceptance and Perceptions Regarding Technologies

Generally, the term ‘social acceptance’ is not clearly defined (Kollmann, 2001). Social acceptance of technology in general has been investigated largely by the industry for marketing and sales purposes, especially since the increase of use and installation of security technologies on the Internet and physically (e.g. in form of cameras), due to the fear of threats to security (Quiring, 2006).

However, researching social acceptance, using research designs – specifically standardised questionnaire – based on the knowledge of past research projects may be problematic, as respondents might give certain statements during an interview, but then act in an entirely different way towards acceptance of the actual technology in a real life situation, without apparent reasons or reasonable explanations. Consequently, the adequate methodological approach to the research of social acceptance has to be individually fitted to the specific research topic and situation (Li, 2004). Additionally, end-users’ participation in the process of technology development, including continuous evaluations of their acceptance of certain technologies, is essential. The problem here is that an inside view at the development of new technologies by outsiders is not always possible, as companies are reluctant to share their research and technological developments until the final product is released to the market. This explains the general lack of integrated end-user research; hence, post-evaluations are usually the only option in academic research of social acceptance studies (Kubicek et al., 1998).

2.2.1 Social Acceptance and Perception of Drinking Water Supply in India

The WHO's Guidelines for Drinking Water Quality, include guidelines on consumer acceptability of taste, colour and odour of water supplies (WHO, 2011). People's acceptance of their drinking water is usually intertwined with the perception of safe drinking water and is related to accessibility and the associated taste, odour and turbidity, as emerged from a review of studies on community acceptance of alternative drinking water supply systems. These studies focussed on: the consumption of municipal water (Turgeon et al., 2004), private supplies (Jones et al., 2005), bottled water (Anadu and Harding, 2000; Doria, 2006), and recycled water (Anderson et al., 2007). Water safety perceptions in relation to POU water treatment, such as household filtration or chlorination, were also examined (Jalan et al., 2003). Banda et al. (2007) report that respondents in rural India cited clarity, lack of odour, and non-salty taste of water as being characteristics of safe water. Nauges and Berg (2009) state that a higher perception of possible contamination risk has increased the probability of households boiling or filtering drinking water before using it. Following Nauges and Whittington (2010), if there is a choice between several water sources, the perceived drinking water safety can influence this choice. A general lack of knowledge about water supply and treatment within the population can be found in most of the countries in the world (Peter-Varbanets et al., 2009). Most end-users are not aware of the treatment processes and infrastructures involved in the delivery of potable water, and therefore rely on trust, taste and appearance of water as quality indicators (WHO, 2011).

Barthwal et al. (2014) indicate that there is a clear lack of research on the perceptions and awareness of rainwater harvesting in India. In their study on people's perceptions in urban spaces in the Indian state Uttarakhand, they found a general willingness to accept rainwater harvesting facilities. The restraint the participants see for the implementation of rainwater harvesting facilities are the current rainwater harvesting unfriendly policies and funding incentives set up by the government. Ward et al. (2013) see further problems in the effort the setting-up of roof-top rainwater harvesting infrastructure requires. Experts of the water,

sanitation and hygiene sector emphasize the challenge of adequate construction of rainwater harvesting tanks in order to avoid potential bacterial contamination of the collected water (Hartung, 1999).

2.2.1 Problem of Centralised Decision-Making

In 2008, the World Bank published data which reveals the inefficiency of most water schemes in India. There are often multiple water schemes existing in the same village to balance the poor functioning of each of these. This is particularly the case in the Indian states Tamil Nadu and Karnataka. The World Bank's analysis shows that water schemes could generally be more efficient if governments and institutions at lower levels were given more responsibility. This should be applied for each village individually, rather than in form of multi-village schemes. Following the World Bank's report, the current procedure under the Panchayat Raj system, although officially aiming at providing more decisive power to the lower administration levels, does not achieve this desired effect (World Bank, 2008b). Another paper, published on the basis of the same study's data also mentions that most of its participants voiced their preference and demand for individual household tap connections - ideally inside their houses - while water schemes and programmes currently in place in India, would follow contrary, centralised concepts of public shared hand pumps and tap stand posts for entire parts of habitations. The reason for this is the government's supply-driven approach to provide 40 lpcd for each rural citizen. They fear that a supply of this quantity might not be guaranteed if every villager has his/her own connection, entailing the potential risk of uncontrollable wastage and leakage (World Bank, 2008a).

2.3 Socio-Cultural Factors and Pressures Within the Indian Context

When reviewing the water supply and water quality issues within the Indian context, there are several important socio-cultural factors which have to be taken

into account. Especially the rural Indian population focusses on social and traditional aspects which play a key role in influencing hygiene behaviour and access to water, as described in the following.

2.3.1 India's Caste System

The diverse cultural dimension and the social fragmentation in India must be considered when dealing with access to water. Studies have found that caste and religion play an important role in the provision of drinking water, especially in rural Indian areas (Balasubramaniam et al., 2011; Government of India, 2011). There seems to be a link between social fragmentation and access to tap water. Communities which are heterogeneous in terms of caste, are likely to have less access to water than those living in a rather caste homogenous environment, while higher religiously fragmented communities are likely to have a better access to water and vice versa (ibid.). Although caste divisions no longer officially exist in India, the government runs various programmes for the positive discrimination of the so-called 'backward castes', in order to bring about their social inclusion. These backward castes include former lower castes such as Scheduled Caste (SC), Scheduled Tribe (ST) and other backward castes (OBC). These programmes targeting these former castes include funds for their water supply or social housing from the government's side (DoDWS, 2010). The Oxford Online dictionary gives the following definition for the Indian term backward caste or backward class: "(In India) a socially or economically disadvantaged section of the population (frequently in *plural*); specifically one for which assistive legislative provision is made." (Oxford Online Dictionary, 2016). Other backward castes which do not belong to Scheduled Caste or Scheduled Tribe are called 'Other Backward Castes' (OBC) (ibid.). Among these groups, Johns (2012) mentions the problem of access to water and sanitation for the backward castes, in her report which she submitted to the Human Rights Council of the United Nations in 2012. She remarks that the access to water and sanitation facilities would largely depend on the good will of the former higher castes, and that access to these

facilities, would often be denied to former lower caste members outside their own habitation areas, by other groups with higher status.

2.3.2 Gender

Gender inequality in India is a major social factor. Water collection and hygiene education is usually done by women, who are the ones responsible for the water collection and hygiene education of children (Conin et al., 2014). At the same time, they are usually not involved in decision-making processes of water policies, although they are the main part of the population. Following the key literature on water and gender related issues, women are the ones mainly responsible for finding water, carrying it home and for household water management, especially in rural environments of developing countries, including India (Jalal, 2014; UNDP, 2006; UN-Water, 2013). Jalal (2014) describes women as 'the primary users and managers of household water' in this context. She also hints at the fact that projects, including water projects, are effectively more successful when women are involved. This is not only the case for projects targeting matters which revolve around issues exclusively concerning women themselves, but other, male members of their community too. There are various projects and funds aiming at gender equality and gender mainstreaming, focussing on WASH projects, e.g. UN Women's Fund for Gender Equality or the Central Asian Alliance for Water (UNDP, 2006). On average, girls and women spend up to six hours per day, collecting water. In the girls' cases, this can hinder them from attending school regularly or even at all (UN-Water, 2013). In African countries, around 90 percent of the collection of water and fire wood is done by women (ibid.). This affects women's chances to seek paid work outside the household, and also minimises the time they have to engage in other activities, including measures to improve their situation, such as women leadership programmes or workshops (Fletcher and Schonewille, 2015). NGOs are supporting community groups of equally mixed gender or exclusively female groups to empower women through campaigns and workshops, and to educate the rural population on aspects and measures of hygiene (Arghyam, 2009; UNICEF and WHO, 2012).

2.3.3 Water, Culture and Religion

In all the world's major religions, water has a significant meaning and is used in various rituals and religious practises (e.g. baptism). Water and washing rituals are also rituals of purification, not only from dirt but also from one's sins, especially for Muslims and Jews. Hindu's regard water as spiritually cleansing, being one of the five elements of nature. Water and rivers are considered to be holy in Hinduism (Omar, 2013). One element of Hinduism in the context of nature and its elements is vaastu, also known as 'Vaastu Shilpa Shastra' and is documented in a treatise (shastra) for the analysis of sculptures and building. Vaastu is based on the idea that the soil is a "living organism" (Anath, 1998) from which life emerges. This energy or "life force" (ibid.) within the soil is called 'vaastu'. In brief, vaastu describes a tradition which aims at harmony of energy and energy flows amongst all living beings and things on earth. This includes all plants and buildings which are also considered as being animate. In order to maintain this harmony, space has to be kept in a certain order, following the cardinal directions, which in vaastu hold a specific space for houses and their interior to be built after. According to vaastu, if this order is neglected in the architecture of buildings, negative energies will be created and these will consequently harm the persons responsible for it and also those living in this specific space. If the principles of vaastu are followed when building, the individual is believed to attain harmony with his/her environment and the universe in a psychological, physical, and spiritual way (Ibid.). Water is seen as one of nature's elements, along with fire, air, earth and space, orienting its paradigm following a perceived cosmic order, in accordance with astrology. Vaastu particularly has a great influence on architectural planning for the construction of houses and the arrangement of rooms within the house (Quack, 2011).

"While spirituality could also cause indifference in the north-east direction, the south-western direction gives control. The householder 'should' occupy this area, at the highest level. Though an overhead tank could be placed here, as it would lend to the height of the building and flow the water towards the north or east, an underground water well here is prohibited. The south-eastern direction related to the fire element is also the zone for electrical gadgets, boilers, computers, etc." (Chakrabarti, 1998).

These religious beliefs might have an influence on people's decisions and preferences regarding their water supply. This will be further explored in the last sections of the thesis (results, discussion and conclusion).

3 Methodology and Data Collection

The scopes of the research project are the social and economic factors that influence the population of South Karnataka regarding their preferred choices of drinking water supplies, facilities and treatment. In this chapter, the choice of methods and the modes of data analysis which have been used are explained. The researcher elaborates on how these methods, the participants and the location for the research project have been chosen. This chapter also includes an outline of how the research has been put into practice in the field, before and during the design of the research, as well as in the following analysis of the field data.

3.1 Choice of Methods

In this chapter, the choice of methods, mode of documentation and data analysis for this research will be presented and explained.

The following table illustrates the process of all methodological steps of this research, from the initial and preparatory phase to the analysis of the fieldwork data and its interpretation:

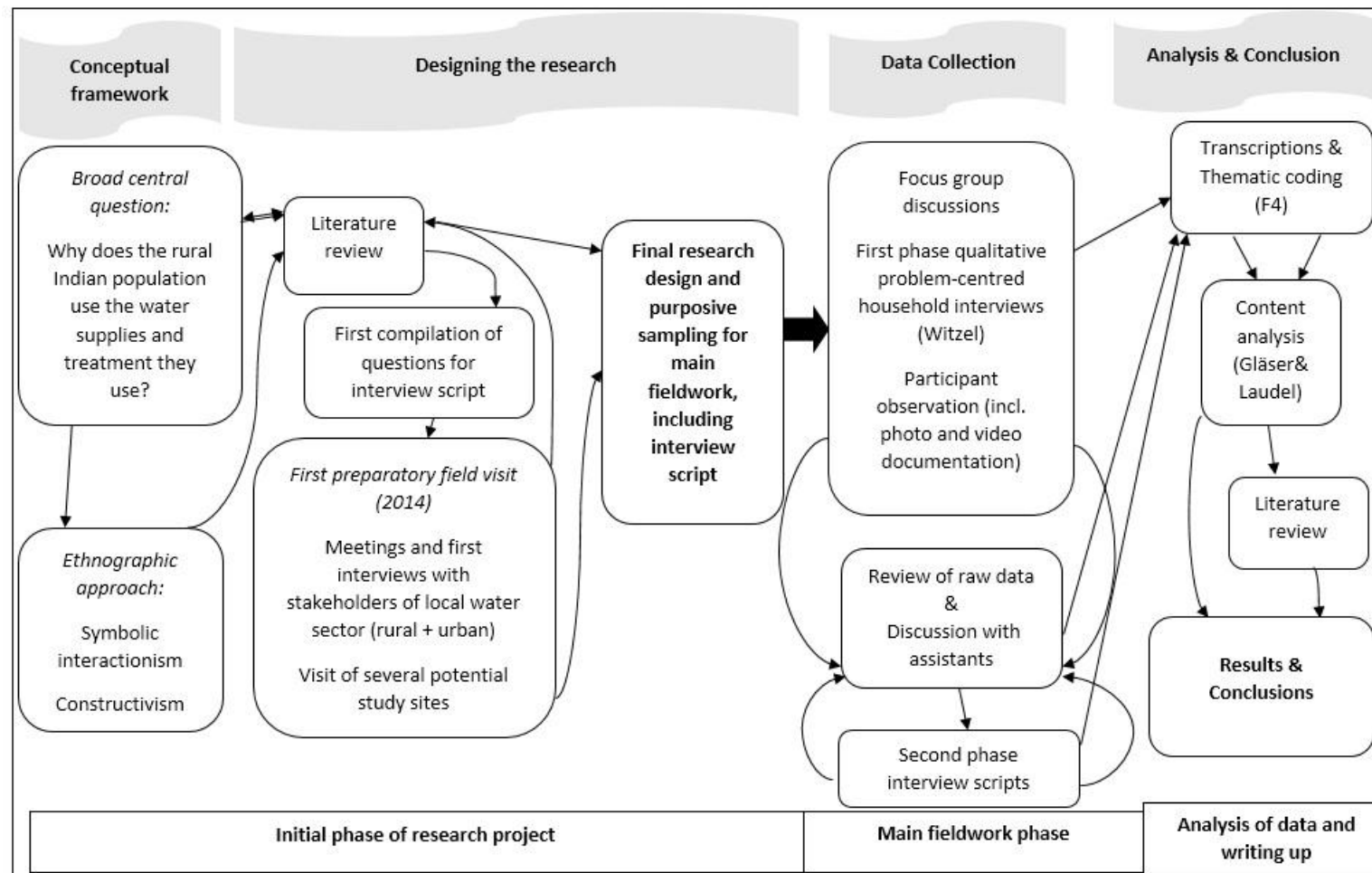


Figure 4 Overview of methodological steps of research

3.1.1 Quantitative and Qualitative Research Methods

Human beings, their behaviour and perceptions regarding drinking water, drinking water facilities and technologies are the focus of this research. Therefore, methods for the research were chosen within the field of social research and social science methods. Within this field, a distinction is made between quantitative and qualitative research methods (Flick et al., 2012).

Quantitative methods are used to quantify facts, objectively measuring them by focussing on variables and employing statistical analysis. Samples in these studies usually consist of large numbers of participants, aiming at representative results, presented in figures, which could be reproduced in the same way, independently of the person conducting the research. If questionnaires are used, they are standardised (Flick et al., 2012).

Qualitative methods, however, are usually characterised by a limited number of interviewees or cases as each individual is thought to reflect the cultural contexts, beliefs and system of values of the entire social group he/ she is a member of. Therefore, all cases are examined in an in-depth manner. Qualitative interviews for example are conducted using open-ended questions, which can on one hand be more structured interview scripts or semi-structured questionnaires. On the other hand, they can also be in the form of interview scripts which are more open and rather take the form of unstructured narrative interviews. If the interviewer uses an interview script during the interview, he/she can follow its questions in a more or less chronological fashion. The questions themselves can rather be in form of topics, with prompts belonging to them, so that the researcher does not use pre-phrased but only ad-hoc questions. Other designs of qualitative research interviews are questionnaires, for which the researcher has phrased his/her questions beforehand and reads them out to the interviewee during the interview. Conducting narrative interviews, usually only one opening questions or cue is given to the interviewee to start the narration, and questions are only asked after this narration, in order to avoid interrupting the interviewee's story. There is a great variety within qualitative research methods, types of interviews and methods of analysis. Qualitative interviews allow the researcher to react flexibly

to the interview situation and the direction the interviewee is following during the interview. In general, research designs employing qualitative methods are likely to be slightly changed and adjusted throughout the research process to account for the varying situations in the field. Qualitative research aims at understanding people's points of view and perspectives by exploring and understanding their social realities. In qualitative research, the researcher becomes the primary tool of data collection and analysis (Neumann, 2003; Watt, 2007).

In the past, quantitative and qualitative methods have been seen as two opposing poles with arguments and discussions between supporters of both sides, especially during the so-called 'positivism dispute' (Adorno et al., 1976). However, methods from quantitative and qualitative approaches have to be chosen according to their usefulness regarding the research topic and research questions (Flick et al., 2012).

3.1.2 Research Perspectives and Choice of Methods

Gaining knowledge about which types of water supply the local population prefers and which reasons they give for these preferences requires an approach which considers the participants' cultural background and their way of thinking and reasoning. These aspects have evolved from their social background, hence trying to understand their life-world is essential. This can hardly be achieved with standardised methods and a quantitative approach, and little was found in the literature on the research topic, so first-hand knowledge had to be gained by the researcher herself. Therefore, qualitative research was chosen as the methodological direction for the research. Numerous research approaches, techniques and perspectives fall under the term 'qualitative research'. As Watt's states, every research project is unique and there is no fixed pattern which the researcher is obliged to follow, but he/she has to decide which approach and techniques are useful for his/her individual research (Watt, 2007). Flick et al. list three broad research perspectives of qualitative research which are not mutually exclusive: the 'symbolic interactionism' or 'phenomenology' approach, the 'ethnomethodology' approach and the 'structuralist' or 'psychoanalytical

approach' (Flick et al., 2012). The 'symbolic interactionism' or 'phenomenology' perspective which focusses on individual and subjective attributions of meaning is based on the concept of symbolic interactionism, following Herbert Blumer:

"(...) humans act toward things on the basis of the meanings the things have for them. (...) Thus, symbolic interactionism sees meanings as social products, as creations that are formed in and through the defining activities of people as they interact. (...) the meanings by the actor occurs through a *process of interpretation*." (Blumer, 1969).

The reconstruction of these subjective views is seen as the tool for entering and understanding the participant's life-world, which usually represents culturally and socially embedded realities and interpretative patterns of the entire social group. Ethnomethodological studies aim at understanding the same patterns within the everyday routine actions including communication patterns of individuals of a certain group. However, the focus here is less on the individual subjective meaning, but rather on the meaning between individuals and groups which is being revealed in everyday routines of actions. The institutional frame of communication becomes included in the researcher's analytical considerations. Hence, the specific context and frame of the actions should be factored in for interpretation and analysis following this perspective. Pre-interpretations and assumptions should be avoided as well as the adoption of the participant's perspective. Characteristic methods of the 'symbolic interactionism'/'phenomenological' perspective are guided, semi-structured or narrative interviews. Modes of interpretation and analysis include theoretical coding, qualitative content analysis, narrative analysis or hermeneutical analysis techniques. Typical field of application of this perspective are biographical research and the analysis of everyday knowledge (Flick, 2012). Ethnomethodological perspectives draw on methods such as focus group discussions, ethnography or participant research and documentation of interactions in general, and collection of documents. Characteristic methods of analysis within the scope of this approach are conversation analysis, discourse analysis, text type analysis, analysis of types of communication and document analysis. Classical fields of application are the analysis of life-worlds and

organisations, evaluation research and cultural studies. The 'structuralist' or 'psychoanalytical' perspective places the assumption of subconscious psychological structures and mechanisms as a point of reference, in attempting to understand participant's actions and their significance. Characteristic methods within the framework of this perspective are the documentation of interactions, photography and filming. The interpretations and analysis methods of the data gathered are objective hermeneutics, in-depth hermeneutics, and hermeneutic sociology of knowledge. Main fields of application are family studies, biographical research, generation research and gender studies, and generation studies (Flick et al., 2012).

In this research project, the symbolic interactionism and the ethnomethodological and constructivist research perspective were combined through an ethnographic approach to the field. Participant observation and descriptions in form of field notes, compiled in a field journal were used, as well as focus group discussions and problem-centred interviews, which are a more problem-focussed form of the narrative interview. For the analysis, a further development of Mayring's content analysis by Gläser and Laudel was employed as mode of analysis. The fundamental assumption of social reality being constructed and the consequent openness to the field by the researcher was necessary to analyse people's everyday knowledge regarding their water supply, as well as to locate their perceptions about the study's topic in their life-world, with their specific cultural background (ibid). Hence, the researcher's approach is characterised by an explorative and open perspective to the field (Schweitzer, 1999). For Geertz, the perspective of understanding the actions and behaviour of actors in the field is the most important aspect of ethnographical research. Therefore, he criticises approaches which are merely functional and structuralistic by trying to explain the situation in the field without making the effort to understand the underlying logic of its actors in an interpretative way. Geertz therefore used what he calls "thick description" in his field notes. Thick description reproduces sequences observed in the field in a neutral way, and as detailed as possible. Through these detailed descriptions of all signs witnessed in the field (e.g. a wink), Geertz wanted to reveal all possible interpretations of these signs which would lead to an

understanding of the actions in the field, providing the researcher's openness for field and research (Geertz, 1973). The postmodern ethnology, however, criticised this particular meaningful, perceptive approach as fragmented, as it would not take the specific social and historical context into account. Postmodern ethnologists therefore only see two solutions to this problem: either addressing the fragmentation itself in a critical way through reflection of the researcher on his/her own work, bias and person, or the dispensing of the scientific nature of ethnographic work and instead turning one's observation into prose (Garder, 1996). Schweitzer (1999), however, is convinced that the aspects of understanding, explanation and interpretation are equally important for the ethnographic research process, subsequently, he does not view these as mutually exclusively but interdependent.

This research project is based on Geertz's ideas, using his thick description during focussed participant observation in the field whilst taking the postmodern critique into account by reflecting on the role as a researcher, the influence of the researcher on the field as well as potential bias of the researcher. Furthermore, Geertz's unwillingness to take symbolic construction of reality and culture into account for analysis, which he has often been criticised for, is accounted for in this research project by a rather micro-analytical focus, including the individual cultural context in which meaning is created through communication and actions in the field (Wolff, 2012). Through this focus, cultural and religious symbols have been partially exposed in this research. The local residents and households interviewed therefore build the main foundation and focus of this research which is one of the reasons – apart from methodological accuracy – why they were interviewed twice, allowing for a better understanding of their perspectives. This procedure should help the researcher in trying to avoid misunderstandings from the researcher side, especially those evolving from her different cultural background. Being interviewed twice also gave the interviewees the chance to adapt and familiarise with the researcher and to open up more over time and notably towards the second phase interviews. Another important reason for interviewing all households twice was the researcher's awareness of those participants likely being not accessible for her directly in any way (e.g. phone or

Internet communication services) after she would have left the study site. Getting accustomed to each other, which is needed to build trust, was also made possible through the focussed participant observation with all households during their water collection, in-between the two interviews with them. It additionally served the purpose of cross- checking the researcher's understanding of the information given by the interviewees during the first phase interviews. The questions in the interview script for the first phase interviews were mainly based on knowledge gained through the initial literature review and adjusted after the initial, preparatory field visit in 2014. The interview script was flexibly utilised regarding the order of its questions. In contrast to this, the second phase interview script evolved from remaining open questions regarding subjects mentioned by the interviewees during the first phase interviews and actions witnessed and recorded through the field journal, photographs and filming by the researcher. This two-sided process's intention was to triangulate between the information found in the literature on one hand and to process the information given by the different types of interviewees as well as through participant observation on the other.

The methods used for this research are presented in the following table:

Table 1 Methodological Aspects of Fieldwork

Type of method	Documentation	Analysis	Participants	Objective of method	Additional documents obtained
In- depth open interviews (interview script used)	Recorded and transcribed, or notes taken from recordings or during interview (in one case)	Coded in several rounds and analysed following Gläser and Laudel's content analysis	NGO staff working in water sector, households, Political leaders	To answer questions derived from literature and gain insights into important aspects for interviewees regarding their water supply and treatment	Drawings of part of pipe network; drawings of local water points, including changes of water facilities over time
Focus group discussions (interview script used)	Recorded and transcribed, additional person to translator taking notes about situation during discussion	Coded in several rounds, analysed following Gläser and Laudel's content analysis	Village women using different water facilities and treatment methods who are of different age, caste, and occupation	First overview of important water-related topics, issues and general water situation in study villages	
Participant observation (including initial village walk with community members)	Field journal, photos and video recordings	Coding of important water related sequences ('thick' descriptions)	Individuals of community	Observing water related activities in practice to better understand these, additional methodological perspective for validation of interview findings	

The research project itself consists of different phases. For a better overview of the project, the following timeline figure illustrates the chronology of the research process:

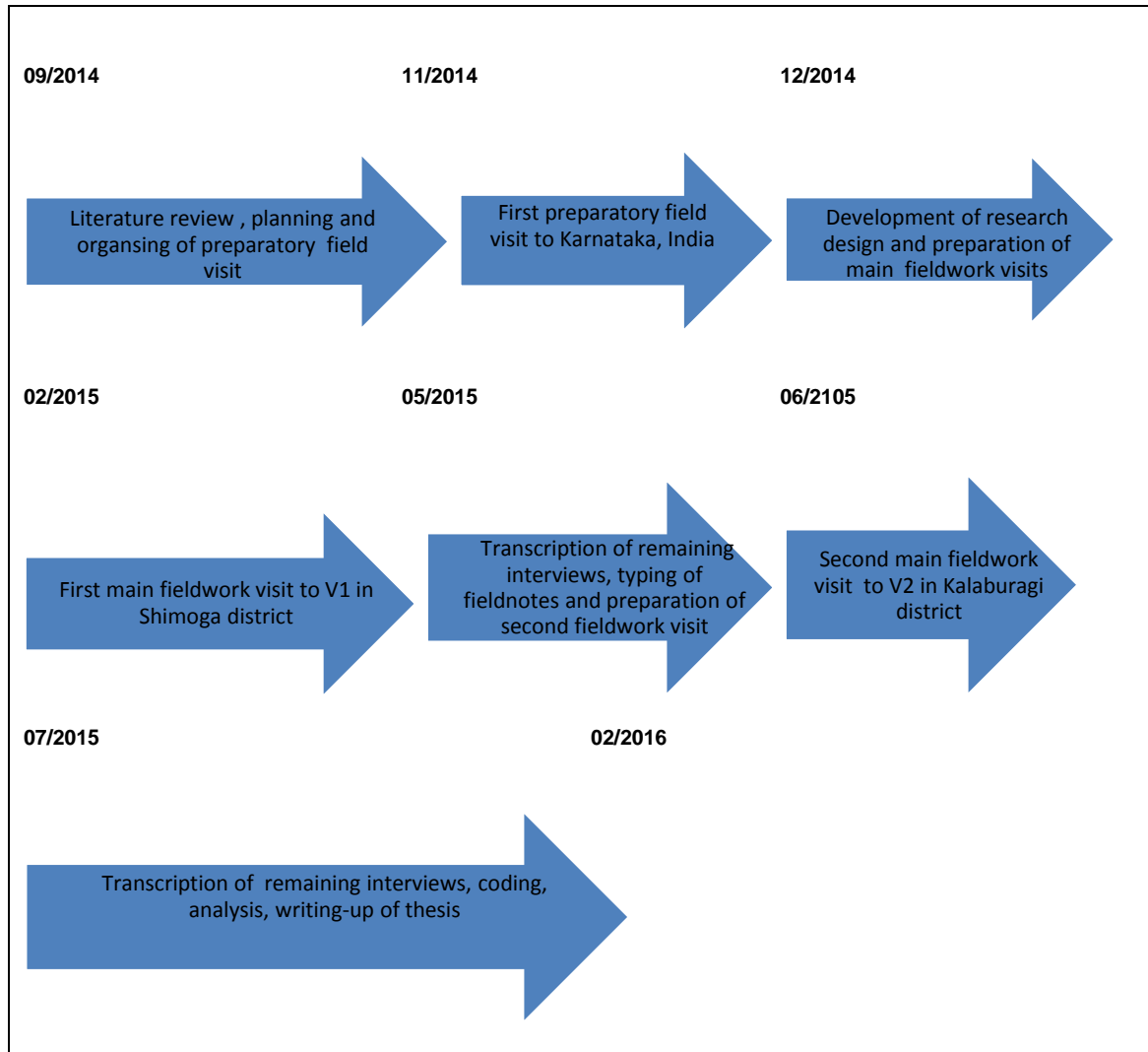


Figure 5 Timeline overview research project

The first step presented in this time line is the literature review which helped to gain theoretical insights on the topic and the situation in the field. Additionally, experts working in the Indian field who had already worked on similar topics or with similar approaches were consulted. Furthermore, an initial field visit was undertaken from the end of October to the beginning of November 2014 in order to familiarise with the region, to conduct initial test interviews and to establish a

network of contacts. Potential study areas were visited with local NGO contacts attained through the Dutch colleague Patrick Smeets, granting the researchers a first access to the field. A first impression of the local cultural context was gained, especially while spending one of the main Hindu festivals 'Diwali' with a guest family in Bangalore. During this initial visit, the challenges in the culturally different context 'Karnataka, India', compared to those of the researcher's home country and continent became obvious. As mentioned initially, these different contexts shape people's perceptions regarding their water supply and treatment in a significant way, as they do regarding all other aspects of their daily lives (e.g. their perception of time, work, relationships) (Hall, 1976 and 1984; Mead, 1994; Holden, 2002). During the initial field visit in 2014, it already became apparent that the local population rejected certain water supplies and used others instead. In many cases, this meant that more advanced water supplies like piped supplies would not be used but many people would instead revert back to traditional water sources, such as open wells.

3.1.3 Criteria for Sampling: Interviewees, Focus Groups and Study Sites

The main idea was to reflect the social reality of the field regarding social structure and different uses of water supplies and water treatment through a non-random purposive sampling. In order to achieve this, criteria were established, following the characteristics found in the parts of Karnataka visited during the initial field visit which are presented in the following. The State of Karnataka has been chosen as site for this research project since contacts with local stakeholders had already been established through the course of projects Cranfield University is currently involved in. Both villages eventually selected as study sites - one in the Shimoga area and one in the Kalaburagi area of Karnataka - had been identified as potential study sites during the first preparatory field visit in 2014. The two study sites were chosen due to their difference in social structure, literacy rate and education level, caste distribution, size, geology, climate as well as types of water supply and different degrees of availability of drinking water along with

different levels of water contamination. Covering two villages seemed a realistic plan for a one-year ethnographic research project, conducted by one researcher. The first study area has a much higher annual rainfall and a rather tropical climate, whereas the other is an arid area with low annual rainfall. There are reportedly no problems with water scarcity or water contamination in V1. The population is homogenous in terms of religious groups, with a mostly Hindu population. The second study village (V2) in Kalaburagi has a more heterogeneous mix of religious groups, and a significant number of Muslims. The literacy rate is very high in the area around V1 in the Shimoga district, whereas it is very low in the village in the Kalaburagi district. V2 in the Kalaburagi district is known for being part of the India's most backward regions, measured by the number of residents below poverty line, who represent 50% of the population in the Kalaburagi district. There is a gap in the development between the North and the South of Karnataka which should be accounted for by picking one study site from each part of Karnataka when looking at the state's water supply and treatment (Government of India, 2001).

The village walk initially undertaken in both villages helped to gain an overview of the location of the different water points and it led to first contacts with the local residents to see who met the criteria and who would be willing to be part of the research.

In the first study site, V1, in the Shimoga district, the social structure of the hamlet of the village chosen was mainly homogenous regarding religious groups as only Hindus were residing here. However, these Hindus belonged to different castes. Furthermore, a balance between different income groups was made. These income groups were identified by land possession, estimated average annual income, and education of the household members. The host family of the researcher, which was the first household to be interviewed (H1), was of middle income, having their own land and open well and earning money working on other farms. They had been collecting water from public taps and a river before building their own well. Their level of education was slightly above the average in the village. The second household (H2), was entirely dependent on their work on

other farmer families' land and they depended on public piped water supply and public open wells. Their level of education resembled the average of the local population's. The third household (H3) owned the biggest area of land, was using rain water as well as well water from their own open well. They belonged to the highest caste and had the highest level of education amongst the three households. H1 and H3 were treating their water by using ceramic candle filter units, whereas the second household was not using any type of water treatment methods.

In the second study area, in the Kalaburagi district, two households (H4 and H5) were chosen to be interviewed. In this study area, the social structures were more complex and heterogeneous. Since the largest parts of the village's population were Hindus and Muslims, the two households were selected accordingly. H4 was a Hindu household and H5 a Muslim household. H4 collected water at the neighbouring family household's piped supply and in cases of emergency they collected well water from public wells. The household members were treating their water with bleaching powder. H5 had their own tap connection which they allowed other people to use after having collected enough water themselves. In order to treat their drinking water, one of them used her clothes as a cloth filter when drinking water from a cup. In the same household, the person responsible for collecting water would let the water run through a sieve when filling the storage vessels used for drinking and cooking purposes. Water provided by water tankers for drinking purposes after large periods of drought in summer months was occasionally used by both households. These tankers would sometimes be ordered and paid for by the local government. On other occasions, the village population would order tankers themselves, sharing the costs.

Both study sites are very different regarding their water problems, social structure, climate and size. In V2, the total population reached around 6000 inhabitants. Given the ethnographic approach, which states that culture and social norms are embedded within the social fabric of a social group or community and hence reflected by each of its members, despite their differences as

individual human beings, the sampling is, in this sense, still representative of the community living in V2.

Christians were not part of the sampling within the households, as in V1, none of the villagers was Christian and in V2, the existence of Christians was unknown and therefore, members of this particular religious group could not be identified or considered as part of the sample. However, there were still Christians who had an influence on this research, as the main research assistant to the researcher in V1 and her family, were Christians who shared their perceptions and views with the researcher too.

Another important criterion was that the number of household members who could be interviewed would not exceed three persons at a time. Some of the potential Muslim households visited had more than ten family members inhabiting a single house. In these cases, an interview would, by definition, have been a group discussion rather than an interview. Furthermore, the difficulty of conflicting statements regarding water supply as up to seven family members could be responsible for the water collection, made it difficult to consider these families as interview households. Children were not seen as part of the sampling since they did not have much knowledge about the water collection process in many cases, technical knowledge about their water or knowledge about water costs.

Interviews with just one person were not always possible as other people tended to join or to listen to the interview, irrespective of the choice of the interview location. In the case of new persons appearing and trying to take part in the interview, they were informed about the purpose of the interview and research, a purpose which the researcher would readily discuss with them after the interview.

Adult household members were free to choose whether they all wanted to join the interview or if only one of them would participate as well as how much personal contribution each of them would provide during the interview situation. The interviews were usually held at interviewees homes, in order for them to be able to demonstrate certain water and treatment related practices and tools, as well as to avoid travel costs and inconvenience for them.

Amongst the interviewees, there were also two focus groups, two NGO contacts and representatives of two local and two district government levels (18 interviews in total) (see Table 1). Additionally, further non-recorded interviews with important stakeholders of the local water sectors have been conducted and documented as part of the field journal (see Table 4).

3.1.4 Focus Group Discussions

In each study village, the first activity after the initial village walk was a focus group discussion amongst women to discover the first few hints to the most important factors, problems and perceptions, and to gain an overall view regarding the local drinking water situation. Prior to the focus group discussions, the leader of the community was identified to help with the group sampling.

Advantages of focus groups are the flexibility of the interaction between several interviewees, which allows the participants to discuss topics amongst each other, raise topics which are relevant to each of the participants and which the researcher might not have asked about or identified himself/herself. Moreover, the dialogue between the group members is more natural, similar to a conversation in a daily life context and will not create the atmosphere of an artificial interview situation with only one person. Disadvantages can be that one or several individuals within the group might lead and dominate the discussion, whereas others remain silent. This is particularly relevant due to the rather socially traditional context of India - where there can be problems with power relations between participants of different status. The remains of the former caste system and the patriarchal social structures can be a challenge whilst using this method. In order to avoid this, some individuals who were observed as remaining rather silent during the conversation were encouraged to contribute or directly addressed with questions to give them a chance to voice their opinions too. It was made sure that the women in both groups knew each other from pre-existing women groups to lower the potential levels of intimidation. These women groups were in both cases members of women 'Self-Help Groups' (SHG) who were meeting regularly in order to discuss the management of their joint funds and

investments. However, the women actively refused to attend the focus group discussion with members of the lowest castes of Indian society in V2 (Kalaburagi district). The focus group discussions were conducted with only women since they are the ones usually taking care of the house, cooking and often the water collection as well. The number of the participants was aimed to be kept under ten participants, however, more women than initially planned usually appeared for the group discussion and some, especially in V2, left the focus group discussion before its ending.

3.1.5 Interviews

In order to guarantee the consistency of this research project's methodology, the same interviewee sampling strategy was kept for both field regions in Karnataka. The number in the second area, in North-Karnataka, was reduced by one household, due to the shorter stay in the village. The following tables provide an overview of the interviews conducted:

Table 2 Focus Group Discussions and Interviews Conducted During Fieldwork

Interview	No. of interviewees	Place of interview	Translator (x=Yes/ - =No)	Recorded (x=Yes/ - =No)	Transcribed (x=Yes/ - =No)	Duration of interview	Date of interview	Districts: Shimoga (Sh)/ Kalaburagi (Ka)
FG1 (1)	9	House of Women Self-Help Group (SHG) leader	x	x	x	57 mins	16/02/2015	Sh
FG2 (1)	11	Anganwadi centre	x	x	x	58 mins	15/06/2015	Ka
H1 (2)	2	Interviewees's house	x	x	x	56 mins & 91 mins	17/02/2015 & 14/03/2015	Sh
H2 (2)	2	Interviewee's house	x	x	x	117 mins & 52 mins	01/03/2015 & 11/03/2015	Sh
H3 (2)	2	Interviewees's house	-	x	-	63 mins & 39 mins	02/03/2015 & 13/03/2015	Sh

H4 (2)	1	Interviewee's house	x	x	-	87 mins & 106 mins	16/06/2015 & 01/07/2015	Ka
H5 (2)	1	Interviewee's house & interviewees shop	x	x	x	117 mins & 101 mins	25/06/2015 & 02/07/2015	Ka
NGO1 (1)	1	Interviewee's office	-	-	-	80 mins	05/03/2015	Sh
NGO2 (1)	1	Interviewee's office	-	x	x	126 mins	13/06/2015	Ka
GI1 (local) (1)	1	Interviewee's office	x	x	-	106 mins	10/03/2015	Sh
GI2 (local) (1)	3	Interviewees's office	x	x	x	102 mins	24/06/2015	Ka
GI3 (district) (1)	1	Interviewee's office	-	x	-	93 mins	19/03/2015	Sh
GI4 (district) (1)	3	Interviewees's office	-	x	x	82 mins	26/06/2015	Ka

FG= Focus Group discussion

H= Household interview

NGO = NGO interview

GI = Government Institution interview

Recorded (- = No) = are interview situations in which the interviewee agreed to the interview but refused to be recorded.

Transcribed (- = No) = notes from the interviews which have not been transcribed but appear in Table 1 have been taken from the recordings in order to reconstruct the interview situation and its outcome, due to the time limit of the project. These interviews are purposely mixed in their type (NGO, household, etc.) and still serve the purpose to add more information to the analysis.

(1)/ (2) = The number in brackets indicates the number of interviews conducted with the particular interviewee or household. All households have been interviewed twice and the rest of the interviewees once.

Table 3 Additional, Unrecorded Interviews

Interview no.	Interviewee	No. of interviewees	Place of interview	Translator (x=Yes/-=No)	Duration of interview	Date of interview	District: Shimoga(Sh)/ Kalaburagi (Ka)
1	Local agricultural Organisation	1	Interviewee's office	-	95 mins	26/02/2015	Sh
2	Academic (water sector)	1	Interviewee's office	-	95 mins	10/06/2015	Ka
3	Academic (water sector)	1	Interviewee's office	-	45 mins	09/06/2015	Ka
4	Journalist	1	Interviewee's office	-	50 mins	12/06/2015	Ka
5	Former local politician	1	Interviewee's shop	x	100 mins	16/06/2015	Ka
6	Local Gram Panchayat member	1	Interviewee's house	x	100 mins	28/02/2015	Sh
7	Brother H5 (owner of private household connection)	1	Interviewee's house	x	30 mins	17/06/2015	Ka

8	Local Muslim family	15	Interviewees' house	x	45 mins	20/06/2015	Ka
9	Local kindergarten staff	2	Anganwadi centre/ kindergarten building	x	120 mins	18/06/2015	Ka
10	Locals of village with arsenic contaminated drinking water	14	Outside, in village area	x	70 mins	22/06/2015	Ka
11	Waterman1	1	Neighbour's house	x	45 mins	16/03/2015	Sh
12	Waterman2	1	Interviewee's house	x	60 mins	16/06/2015	Ka
13	Waterfinder1	1	Guest household's house	x	90 mins	16/03/2015	Sh
14	Waterfinder2	1	Interviewee's house	x	20 mins	24/06/2015	Ka

Local Gram Panchayat member = each village belonging to the same Gram Panchayat area elects a political representative to have their interests advocated during the regular Gram Panchayat meetings (Gram Sabhas). Villagers are free to report their complaints and interests to their Gram Panchayat member at any time.

Waterman = a local person nominated and paid by the Gram Panchayat to open and close the valves for the water supply and to direct water towards each house. He is also responsible for the cleaning of the water tanks used for public piped water supply in his area. He is the person locals should address with complaints regarding their water supply which he reports to the Gram Panchayat, as well as all failures and issues around water facilities he notices himself. In some villages, the Waterman is also responsible for collecting the land and water tax in his local area (in V1 he was responsible for collecting water tax, in V2, the Gram Panchayat's Bill Collector was in charge of this task).

Waterfinder = a person in mostly rural places who is locally known for the ability to point out groundwater sources and consequently places for open wells to be dug or bore holes to be drilled. His services are used by private persons as well as by rural governments (the Gram Panchayat of V1 reportedly made use of his services regularly, whereas the Gram Panchayat of V2 did not). Waterfinders use tools which are believed to indicate a shallow groundwater source through movement when placed above it. These tools include golden necklaces, coconuts, iron sticks, coins and Y-shaped tree branches. In this sense, it shows parallels to dowsing (Keen, 2010). The term 'Waterfinder' evolved from the interview with Waterfinder1. It is not to be seen as official name of persons performing this task.

These stakeholders (Table 2) have been identified as important informants for (drinking) water-related issues through the initial literature review as well as during the first field visit. Since the focus of this research project lies within the scope of the local people's perceptions and preferences of water supplies, local individuals, such as the household members, build the core of this research and even more so by their numerical proportion of the interviewed stakeholders (18 interviews in total, of which ten in total were household interviews).

All interviews were started either by reading out the verbal participant consent - the latter being translated to Kannada or Hindi by the research assistant if necessary - followed by questions related to personal information of the person and, if applicable, the organisation he/she works for. To bridge from this introductory part of the interview to the main topic of the research, an open question, asking the interviewee to explain their associations with 'water' in general as a warm-up phase, was used. From this point, the actual interview script was used for the rest of the interview, including further clarifying ad-hoc questions.

3.1.6 Interviews with Government Representatives

Members of the local village government (Gram Panchayat) were interviewed as well. These were the Panchayat Development Officer (PDO) which constitutes the highest political authority in decision-making within the Gram Panchayat. In V2, the Bill Collector (responsible for collecting land and water tax) and the Deputy Secretary (who is the second highest position within the Gram Panchayat, following the PDO) were willing to join the interview between the researcher and the local PDO. Gram Panchayat members meet regularly to discuss local issues in meetings called 'Gram Sabhas'. Gram Panchayats are also considered as self-governments in order to empower the local villages as a corner stone of the Panchayat Raj system (Ministry of Panchayat Raj, 2015). Further interviews were conducted at a district level (Zilla Panchayat), with the respective engineer employed by the district government (ZP) and responsible for the study villages, as well as the Zilla Panchayat's President and his Deputy Secretary. These

government employees and representatives were interviewed with regards to technical questions and policies in terms of the water supply, its funding and the decision-making processes related to drinking water technologies.

The identification of specific potential participants and important stakeholders within this sampling, however, has been achieved with the help of several experts of the field. Amongst these experts were University professors specialised in the fields of social work, agriculture and microbiology as well as local journalists writing on water and sanitation issues, agricultural NGO staff from rural Karnataka and from Bangalore's urban area. They helped with identifying the exact persons and providing their contact details and in making first contact with them.

All interviews used for the analysis – apart from one where the permission to record was denied – have been recorded after obtaining permission to do so by the particular interviewee. All participants have been assured personal anonymity, including their village names.

3.1.7 General Interview Script

The interview script was designed in an inductive-deductive manner. The starting points for this process were findings of the initial literature review and the initial field visit in October-November 2014. From these findings, different sections of topics were formed and questions around these topics allocated to each section. There was one script for households as end-users and another one targeting professional stakeholders in the local water sector. The categories and sub-categories represented in the interview script for households are as follows:

Table 4 Categories of General Interview Script

Main Categories of General Interview Script	Sub-categories of General Interview Script
Access to water, and water storage	<ul style="list-style-type: none"> • Types of all sources of water for all purposes • Belonging and sharing of water points • Availability of water • Water storage • Water collection • Water tariffs and expenditure
Personal perception and opinion related to maintenance, water access and water quality	<ul style="list-style-type: none"> • Knowledge of water policies and treatment • Trust in water-related government work and person of trust in water-related issues • Personal hygiene measures and waterborne diseases • Personal perception of water quality, overall water situation, water tariffs • Personal preferences and ideals regarding water facilities and treatment technologies

The interview script served as a guideline for the interviews, however, if an interviewee decided to end the interview due to his/her schedule or if he/she decided to speak about an aspect important to him/her regarding the research subject, ad-hoc questions could be added or questions left out. The same procedure was adopted for the order in which questions and topics were asked, which was kept interchangeable to attain a conversation situation as natural as possible.

The researcher followed Andreas Witzel's method for designing problem-centred interviews for her research. While openness was the main criteria of this research, its focus was on a specific topic or problem, namely the rural population's perception and the use of water supply and treatment. Witzel's

approach was applicable to both at the same time: maintaining the openness of the research, whilst maintaining a clear focus on the specific water and water treatment problematic of rural sites. Problem-centred interviews are similar to narrative interviews; however, they are more structured and focus on a certain topic or problem. They begin by collecting basic personal data about the interviewee from the start. This is followed by a warm-up phase, which in this case was initiated by asking the interviewees what they associate with the term 'water'. After this, the actual main interview phase starts, during which – in contrast to narrative interviews – the interviewer can ask questions regarding different aspects of interview topic, or comprehension and ad-hoc questions (Witzel, 2000).

3.1.8 Translated Interviews

The majority of the population in rural areas only speaks the local languages Kannada or Hindi. This communication problem was overcome by working with research assistants, who also functioned as interpreters and translators. The assistants also operated as gatekeepers to local communities and as assistants for the organisation of logistics, advisers for travel purposes, adequate clothing as well as appropriate communication during interviews. Each of the conducted interviews was reviewed and discussed with the particular research assistant who had been present and translating on scene. These discussions included the clarification of remaining open questions from both the research assistant's and the researcher's side and the discussion of the interview as well as the translation situation in general. All research assistants were informed about the purpose and goals of the research during an initial meeting. The use of the term 'particular research assistant' points towards the fact that several research assistants were used during the research project. During each initial meeting of researcher and research assistant, the research assistant was given the chance to ask questions about the research; the interview script was read together and explained by the researcher, question after question, allowing for the assistant's feedback and advice. During these initial meetings, the major focus was on the phrasing of

interview questions in order for the research assistant to be able to adequately translate and to make the interviewee feel comfortable during the interview, which was the major focus. Advice was also given in these meetings as to what appropriate clothing would be for the researcher to wear.

Difficulties during the work with a translator are that the researcher has to trust the translator that he translates correctly, without changing what was said or leaving important aspects of the speech out. Furthermore, the social position of the translator in relation to interviewee and researcher has to be considered and reflected on when choosing a translator who will not influence the interview situation through his/her presence more than necessary (e.g. through age difference or gender hierarchy) (Edwards, 1998; Temple, Young, 2004; Squires, 2008). Additionally, the role as a translator for a foreigner - so potentially appearing to be one unit with the researcher to the interviewee but at the same time coming from the same culture and background as the local interviewees - was discussed with the translator and identified as a potentially occurring problem too. Although the researcher went through the interview script with each of her research assistants in the beginning, she repeated important instructions to him/her before each interview.

3.1.9 Second Phase Interviews

After every first phase interview, a first evaluation of its individual outcome was undertaken. This was done by identifying topics mentioned by the interviewees which led to a catalogue of categories of topics. All these categories together formed the basis for the respective new interview scripts for the second phase interviews with the households of each village. Additional to the experiences from the first interviews, the researcher had also undertaken a village walk and participant observation for a significant time (at least 50% of the field period had passed at this point in each village). By doing this, all the available water points and collection methods in the area were known to the researcher. The preparation of the second phase interviews also included producing pencil drawings of all types of water points used in the areas by the researcher

(borehole, open well, tap stand post). Additionally, photographs and videos taken during the participant observation which showed unclear water-related practices of special interest to the researcher were sorted and taken to the second phase interviews, to be shown to the interviewees as well. The drawings helped in asking the interviewees to rank the different water points in their village and to explain their choices, referring to them. Furthermore, it seemed to help the illiterate interviewees in particular to explain their opinions in a more structured manner than during the first interviews.

3.1.10 Participant Observation

Participant observation is a method that originated from field work of Franz Boas and the urban research of the Chicago School (Flick, 2012). Currently, it is a common and important technique in qualitative research and a core element of ethnographic research (LeCompte and Schensel, 2013). For this research project, open participant observation was used, during which the participants were aware of the researcher and the subject and purpose of her research. This participant observation was mainly focussed on water-related activities. The researcher is aware of the fact that her presence might have influenced the field and participants and therefore their actions. Hence, triangulation between the different methods used was necessary. This process includes validation of the research results and general outcome through their review by participants of the research themselves. Maintaining the 'outsider's view' was achieved through critical self-reflection, the separation of neutral observation, emotions, potential interpretations and thoughts in the documentation of the observed situations in the field journal. The field journal was kept and updated on a daily basis in handwritten form. In this way, the researcher produced a specific reality of the witnessed 'truth' as outcome of her research. Additional to the field journal, films and photos were taken by the researcher as part of the documentation process of water-related activities in order to capture and to illustrate them. Photos and videos are to be understood as part and addition to the field journal and not as individual data that has been part of an individual analysis. These photos and

videos were also used during second phase interviews as mentioned in the sub-chapter about these above (ibid; Flick, 2012).

In general, participant observation was used for this research to allow the researcher to gain an in-depth view on drinking water-related practices, especially on those the interviewees might not be aware of themselves and who therefore might not mention them in interviews or during verbal communication. Furthermore, most of the water practices require an observation over a longer time to witness them as they would be carried out normally, whereas they might be acted out differently when asked to be demonstrated purposely. The participant observation was carried out to a moderate extent in this research in order to avoid losing objectivity (“going native”) but to still be enabled to become part of the social group the researcher was staying with (Emerson, 2001).

During the first main part of the field work in February and March 2015 (seven weeks), the researcher conducted her research whilst living with the first household of her research fulltime. This allowed for a deeper insight into customs and religious aspects and meanings of water in general as well as water-related practices in the household. During the second field work trip in June and the beginning of July 2015 (5 weeks), the researcher stayed in the guest room of an NGO office which was one of her contacts in the area and travelled to interviews and the study village by means of public transport, only staying in V2 overnight on three occasions. During the entire research, the public transport was used whenever possible.

3.1.11 Village Walk

Initially, after the arrival at the study site, a village walk with a translator and a local community member was undertaken in order for the researcher to familiarise herself with the study site, the water points, the members of the local community and the local water situation. Photos were taken and several short ad-hoc interviews with locals were conducted and documented in the field journal.

3.1.12 Production of Water Point Map

No map of the local water points was available in V1. Since the village had only a very limited number of houses and inhabitants and since her guest family H1 had been living in the area for generations, the researcher took the chance to ask the household members of H1 to draw a map themselves. This map included all water points and sources in the village and served as basis for a constructive discussion about the history of the water points in the area and how they have changed over time, which was again documented as part of the field journal.

3.2 Triangulation

Critics argue that triangulation has often been used with the goal of gaining objectivity and putting pieces of different methods together separating data and information from their context in order to gain a broader picture of the research topic and field (Silverman, 1985). Therefore, triangulation is to be understood as a way of gaining a deeper understanding of the research topic and serves rather to secure and to further explain data and information gained during the research process (Denzin and Lincoln, 1994).

Triangulation in this research project has been achieved by looking at the research topic from different perspectives, using different approaches: interviews with private households, NGOs and government representatives as well as focus groups. Furthermore, different perspectives on the research topic have been guaranteed through the use of different approaches in form of different methods, such as participant observation, including village walks and problem-centred interviews with different stakeholders. The results of the field data added new aspects to the research and inspired for new reviews of the existing literature, in order to validate the findings.

3.3 Role of Researcher and Bias

The researcher is a white European female in her early thirties. While living in the field, different roles were assigned to her, which differed in the particular context and social environment she was in. The researcher has often been described through different attribution as a family daughter by participating household members of H1, H4 and H5. The guest family in the first village described her as being their daughter they had to take care of and assist. During her second stay, she was seen as a foreign colleague and partner by the NGO hosting her and as a representative of the European institution 'Cranfield University'.

In general, the researcher was not native to the environment of the field, which gave her a more 'foreign' and outside approach to the field and the processes happening in it. This process of immersion into the culture of the field, however, can lead to a habituation to the field, including an adaptation of the researcher, which on one hand can result in the perception of the field as his/her home culture or as being an alien culture, both potentially resulting in less openness towards the field after becoming accustomed to it (Streck, 1995). In order to avoid this effect, to become aware of it and to unmask and minimise bias, the researcher returned home for a while after periods of research in order to reflect about the field periods, finish transcriptions and type hand written notes. Moreover, a continuous reflection of her role as a researcher in the field, her actions and influence were part of the research approach. Notes for the field journal were written in table form, dividing neutral descriptions of observations from emotional reactions and responses, as well as leaving room for first ideas for interpretations in a third column (LeCompte and Schensul, 2013).

3.4 Research Ethics

Cranfield University's ethics were followed during the research project, risk assessments and ethics approval produced for preparatory and both main field work trips and approved. The risk assessment took all foreseeable potentially dangerous situations for the researcher into account, including strategies to

tackle them. This served the purpose of considering and identifying potential risk beforehand, in order to avoid them or to be prepared for them in the case they occurred. These potential risks included aspects of the researcher's health and safety as well as interviewees' safety and potential risks which would restrain the researcher from completing the research project successfully (e.g. theft of her equipment). A proposal outlining the execution of the research project was produced in order to guarantee that no harm would come to the participants of the research project. Participants were informed about the content and aims of this research project and given the chance to opt out of it at any time during the research, simply by informing the researcher or her assistants. Interviewees were given the choice of having on one hand a written participant consent form handed to them, in which they would be informed about the research project through a short text, the researcher had prepared and sent to the Cranfield Ethics Committee after the aforementioned interviewees had read and signed it. The alternative was to agree to a verbal participant consent which was read out and then translated to them and which interviewees then had to agree to verbally; this agreement was recorded on tape using a voice recorder.

3.5 Analysis and Transcriptions

In the following and last two sub-chapters of the methodology section, the transcription and analysis programme and process are described.

3.5.1 Transcriptions and F4

Interviews (see Table 3 and Table 4) have been transcribed using the German transcription software F4 (Dresing et al., 2015), shortly after the interviews had been conducted. Non-verbal communication and breaks have not been transcribed since most of the interviews were translated. The use of F4 transcript allowed for coding afterwards in the F4 analysis programme. This analysis programme helped to label parts of the transcripts with categories and sub-categories. The coding took place in several rounds. The results from this

analysis were compiled in a document and sent to local contacts and colleagues from the field itself for comments and validation. These steps should help to minimise bias and false conclusions.

3.5.2 Analysis

The analysis has been conducted by using the content analysis following Gläser and Laudel (2010) which is based on Mayring's method of content analysis (Mayring, 2000). It is important to note that - as also visible in the title of Gläser and Laudel's book about their methodological approach - their type of content analysis is suited for expert interviews. Their definition of an expert is rather broad, as they view every person who possesses particular knowledge about the social aspects relevant for the study as an expert (Gläser and Laudel, 2010).

In comparison to Mayring's approach, Gläser and Laudel's further development of Mayring's analysis takes the common critique of Mayring's approach into account by including an inductive approach into the analysis process. This means that instead of limiting the analysis to Mayring's fixed system of categories, which are exclusively set up based on literature before the fieldwork phase, Gläser and Laudel offer the option to adjust and extend these categories using the data gathered in the field. The raw data for the analysis are in this case the interview transcripts, including additional notes from the field journal. Gläser and Laudel's approach facilitates a more data-grounded interpretation of the collected data and a more flexible approach which allows for new knowledge evolved from the field data as well. These findings are then grounded in the data gathered, as well as in a revised literature search for validation. In the next step, the categories and sub-categories are 'cleaned' by merging scattered and repeatedly appearing data - for example: the same findings within initially separately appearing categories. In the last step, the findings in the different categories are used to answer the research questions (ibid.).

The content analysis consists of five major steps:

Step 1: Theoretical preliminary considerations. These are presented by single sections and questions in the interview script, mainly based on the initial literature review and first preparatory field visit in 2014.

Step 2: Preparation of extraction: development of a first basic category system based on main categories or themes in interview script (see headlines of the interview script with sub-categories in the appendix).

Step 3: Extraction, which is the key of qualitative content analysis following Gläser and Laudel; it involves the building of categories based on transcripts and extraction of data through attribution and allocation to these categories (deductive and inductive).

Step 4: Concentration of data: Summing up identical and scattered information and precise allocation to categories and sub-categories, from both the categories developed from the interview script categories and from the categories emerged during the analysis. The final version of these 'cleaned up' categories can be found in the results section of the thesis.

Step 5: Final analysis of data: Answering the research question. This step is finalised in the conclusion of the thesis.

3.6 Ensuring the Quality of Research and Data

The previous chapters have hinted at techniques used to ensure the quality of the research and its tools. Ensuring the quality of this study implies that the research techniques employed progressed towards the goal of answering the research question appropriately. Therefore, in this section, all provisions made in order to avoid errors in the research process are listed and explained.

The researcher structured and planned her research project, which is important for ensuring its quality. In the first phase of the project, she familiarised herself with the field in literature-based and practical ways. At the beginning of the study, a broad literature review was undertaken. From these findings, a first interview script with broad categories concerning the water supply and treatment situation

in Karnataka's rural and urban area was compiled. This interview script was used for the first test interviews in the field. The interview script was extended throughout the course of the research project. With the information gathered, the researcher gained a realistic image of the possibilities for her research project, regarding potential participants and the options for its methodological framework. Careful planning for her main fieldwork, whilst still leaving room for adjustments to the field, was one of the quality criteria of this research. Another important criterion in this context was the researcher's openness to the field which was ensured through continuous reflections of her views on the field in order to minimise bias and false interpretations. This was provided through several mechanisms. Triangulation in the form of a combination of different methods, which were described in detail in the previous sub-chapters of the methodology section, ensured the validity of the data gathered and facilitated a larger density of information on the subject in particular by providing different angles and perspectives on the same issue. These angles and perspectives were also the purpose of the sampling of the participants. After each visit to the field, another review of the literature about the witnessed facts was conducted. The second phase interview with the participating households was another tool to minimise bias and false responses of the interviewees as well as false interpretation from the researcher's side. An interview symbolises only a snapshot of a person and his/her life-world and is consequently detached from his/her daily life-routine. It is an artificial situation with asymmetrical roles between both interview partners, one being in the role of the interviewer and inquirer and the other one in the role of the interviewee and respondent (Flick et al., 2012). This situation bears chances and risks. Given this constellation, the interviewee might reveal facts, which he/she would not usually mention to a person he/she has continuing, close relations with. On the other hand, he/she might present himself/herself under a different light than he/she normally would act. The latter effect was counteracted by participant observation, especially linked to water-related activities and the second phase interviews. To prevent potential misunderstandings during the research, the interviewees were told that 'right' or 'wrong' answers did not exist and that it was acceptable to admit ignorance regarding a topic or to refuse to

answer certain questions. In cases of unclear statements or explanations, the researcher asked further questions until the information became clear. Regarding the documentation of her observation, observed actions in the field and the researcher's interpretations were separated. Each observed water-related situation was documented as densely as possible. Written memos of the interviews describing the interview situation were produced immediately after the interviews. The researcher regularly distanced herself from the field by dividing fieldwork into several periods. These periods were used for transcriptions and further literature reviews. The use of transcription and analysis software helped to organise the data in a systematic way, being able to rearrange parts of the interview and grouping them under codes and sub-codes. The results from the analysis were cross-checked with NGO contacts. The NGO contacts discussed the results with members of the five households where possible.

4 Results

In this chapter, findings from the problem-centred interviews, participant field observation and documents collected in the field during the research project are presented. Initially, V1's and V2's districts are briefly described, which is followed by a presentation of the findings for both study sites, V1 and V2. 4.1, 4.2, and their sub-sections give a descriptive and general overview of the water use, water supply, treatment practices and situation in V1 and V2. These are followed by a more detailed presentation of the socio-cultural and economic conditions dominating the rural population's preferences in regards to their water supply and water treatment. Quotations from the interviews conducted during the fieldwork are being used as references throughout the presentation of the results. Most of these quotations where a translator has been necessary have undergone small changes, compared to the original versions, for a clearer understanding. The meaning has not been changed through this process. In some cases, additional explanations have been added to the quotes for the reader in brackets.

4.1 Description of Study Districts

Karnataka is a state in South-India, bordering on the Indian states of Goa, Maharashtra, Telangana, Andhra Pradesh, Tamil Nadu, Kerala and the Arabian Sea. Its capital is Bangalore, also called Bengaluru.



Figure 6 Map of India, Karnataka State marked in red (Google maps)

As per the census data of 2001, the total population of Karnataka is 61 million, which accounts for around 5% of India's total population. 61% of Karnataka's population resides in rural areas. Their main occupation lies within the agricultural sector. The overall literacy rate is 75%. Karnataka comprises 30 districts and at 190,000 square kilometres is the 8th largest Indian state (Government of India, 2011).

4.1.1 Shimoga and Kalaburagi District

The basic data regarding both districts are presented in the following table:

Table 5 Basic Data: Shimoga and Kalaburagi District

	Shimoga district	Kalaburagi district
Population	1.8 million	2.6 million
Population living in rural areas	64%	64%
Distribution of religious groups	84% Hindus, 13% Muslims, 1% Christians, 2% other religious groups	78% Hindus, 20% Muslims, 1% Christians, 1% other religious groups
Literacy rate and rank within the State of Karnataka	80%, rank 6	65%, rank 27
Rainfall (annual average)	Above 1500 mm in most parts	700mm

The first study site visited for the main field work trip for seven weeks in February and March 2015, was located in the Shimoga or, as it is called in Hindi, ‘Shivamogga’ district in west-central Karnataka.

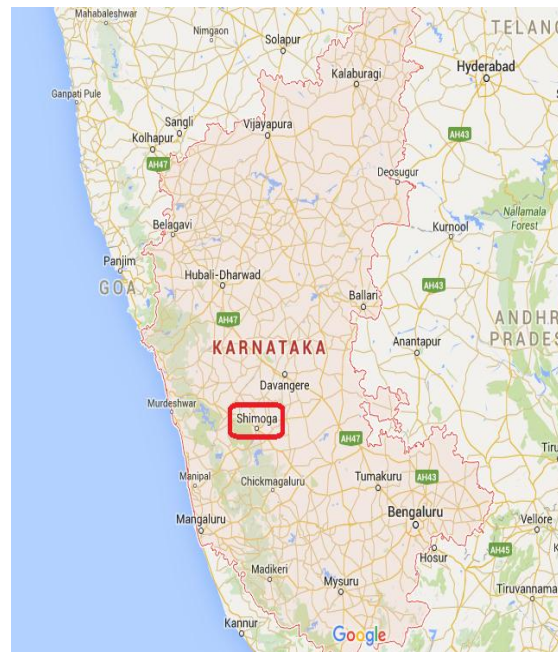


Figure 7 Location of the Shimoga district in Karnataka (Google maps)

The Shimoga district has a population of 1.8 million and its literacy rate is slightly above average in the state with around 80 per cent, ranking Shimoga as 6th within the state (Directorate of Census Operations Karnataka, 2014). 64% of Shimoga's population live in rural areas of the district. 84% are Hindus, 13% Muslims and 1% Christians. Other religious groups are Sikh, Buddhists and Jain (Government of India, 2011). Shimoga is close to the coastline and has the highest rate of rainfall in the state with over 1500 mm/year (Parisara Foundation, 2003).

V2 is located in the Kalaburagi district. Formerly called Gulbarga, the district has been re-named to its former Hindi name Kalaburagi, and is located in North-Karnataka.

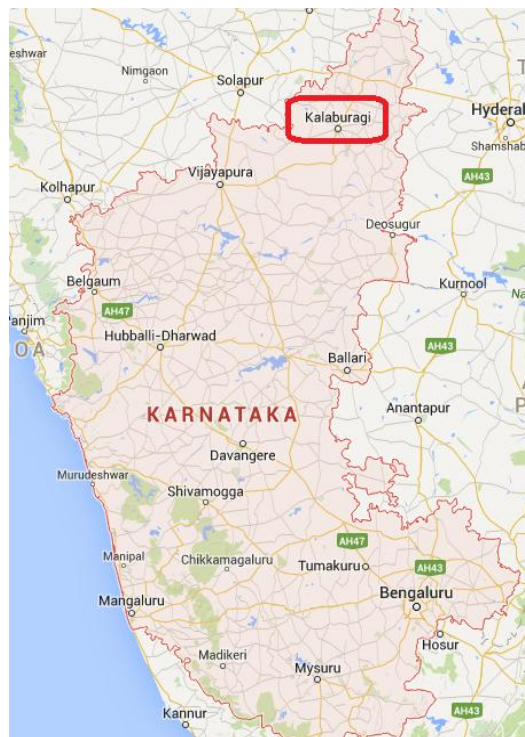


Figure 8 Location of the Kalaburagi district in Karnataka (Google maps)

It belonged to the so-called Nizam kingdom, together with the region around Hyderabad, which is now part of the state of Andhra Pradesh. The former Nizam region is still characterised by being one of the most backward districts in India in terms of its social and economic development (Directorate of Census Operations Karnataka, 2014). This region - which also includes the districts of Raichur, Koppal and Yadgir - is still commonly referred to as the 'Hyderabad - Karnataka region' - to highlight its difference as a backward region in comparison to the rest of Karnataka (Government of Karnataka, 2014). The Kalaburagi district has a population of around 2.6 million, with a literacy rate of 65%, which is below the average within Karnataka and places the district at rank 27 out of 30 within the state (Government of India, 2011). 64% of the district's population live in rural areas. 78% are Hindus, 20% Muslims and below 1% Christians. Other religious group in the district include Sikh, Buddhists and Jain (ibid.). The annual rainfall for the district measures up to 700 mm/year on average. The Kalaburagi district, in contrast to the Shimoga district is one of the ten districts within Karnataka – including Bangalore urban – with overdeveloped groundwater utilisation (Parisara Foundation, 2003).

V1 is located in a taluk – the intermediate administration level between village and district level, including several revenue villages - which is rated amongst the most backward in the district of Kalaburagi, being part of the Hyderabad-Karnataka region and thus implying that the district itself is one of the most backward areas in India (MoPR, 2007). Backwardness regarding districts is not clearly defined but referred to as an underdevelopment compared to other districts. This includes a lack of adequate electricity or water supply and infrastructure, education, including the number of schools and employment; all of these social aspects which are generally not clearly defined further in the government documents available (MoPR, 2007). The affected regions need to outline their individual form of backwardness when applying for the national Backwards Regions Grant Fund (BRGF) programme (ibid; Government of Karnataka, 2014). Factors labelling the region Kalaburagi as backward are poor governance through untrained staff, a low level of literacy and the still deeply rooted caste system within the structures of society, and hence social inequality

and subsequent high poverty (Government of Karnataka, 2014). Kalaburagi is mainly known for agriculture and its cement industry. The number of women who are engaged in marginalised work with unsteady and insecure income is constantly high and one of the major concerns for the area as part of being declared a backward region (ibid.).

4.1.2 Water Situation in the Case Study Villages' Districts

The overall water situation in V1 in Shimoga district is problematic in periods of drought, as the electricity supply - which is needed to operate the water pumps to direct water from the water source to the water tanks or in case of some piped supplies, directly to the pipe network - becomes irregular. During those times, the villagers use other public or private water facilities (taps, open wells, rivers) which are located further away from their houses than the ones they normally use. Water is supplied to individual households or small hamlets as the villagers live scattered near their farm land. The water quality of all of the available water points in the village area is described as potable without need for treatment. Every household in the village has their own toilet. The water situation is generally described as one of the best in Karnataka all year, aside from the problems during drought periods as mentioned above. Over the course of these droughts, some of the local wells dry up as well.

The overall drinking water situation in the Kalaburagi district is described as unsatisfactory (Government of Karnataka, 2014). Around 30% of households in the district have to collect and carry water to their households from outside their premises. Tap water is the major source of water supply in the district. The drilling of boreholes and their use for centralised piped supply has increased, whereas the use and building of hand pumps has significantly declined (ibid). Similarly to the Shimoga district, wells often dry up and a lack of electricity in summer leads to further challenges. When this happens, water tankers - usually paid for by locals or in rare cases by the government - are used to supply the village population. The district as a whole is classified as drought prone (ibid.). Around 80% of the population practise open defecation in the taluk of Village 2. Only

around 10% of the taluk's population has access to toilets. Within the study village itself, the Gram Panchayat and local community leaders estimated that around 25% of the village's population has access to toilets. Observations by the researcher regarding the existing facilities in the village suggest a significantly lower rate than this. There is a high density of houses and population, therefore the water is supplied primarily through pipes to stand posts for collective use.

4.2 Water Supply and Treatment in Case Study Villages V1 and V2

The basic characteristics and data of both study villages, also regarding their water situation are presented in Table 6:

Table 6 Summary of Situation and Population in Both Villages

V1, Shimoga district, West-central Karnataka	V2, Kalaburagi district, North Karnataka
<ul style="list-style-type: none"> • Small hamlet within village of 51 inhabitants • Population rather homogenous 	<ul style="list-style-type: none"> • Village has around 6000 inhabitants • Scattered Muslim families, separate Scheduled Caste wards within the village
<ul style="list-style-type: none"> • Gram Panchayat and Zilla Panchayat are the key government institutions in charge of water supply 	<ul style="list-style-type: none"> • Engineer (Taluk Panchayat employee) together with local Watermen (Gram Panchayat employees) have key knowledge about local water supply
<ul style="list-style-type: none"> • Houses scattered (low density) 	<ul style="list-style-type: none"> • Houses close to each other (high density)
<ul style="list-style-type: none"> • Every household has their own toilet 	<ul style="list-style-type: none"> • Open defecation common (only around 25% or less of the villagers have access to toilets, some of these toilets are shared)
<ul style="list-style-type: none"> • Mainly use of open wells (piped supply available too) 	<ul style="list-style-type: none"> • Mainly piped supply (wells only used for washing clothes and if piped supply fails)
<ul style="list-style-type: none"> • Temporary use of different water sources throughout the year 	<ul style="list-style-type: none"> • Use of different water sources all year
<ul style="list-style-type: none"> • Usually POU treatment in households (candle filter, boiling) 	<ul style="list-style-type: none"> • Water is usually not treated
<ul style="list-style-type: none"> • One hand pump in the village (not being used due to poor water quality) 	<ul style="list-style-type: none"> • None of the hand pumps in the village is functional
<ul style="list-style-type: none"> • Piped supply: raw water source: surface water (pond) → water seeps through to → large open well → is pumped to → GLR → and released to → pipe network and tap stand posts 	<ul style="list-style-type: none"> • Piped supply: raw water source: borehole (groundwater, 150-250ft/ 46-76m deep) → is pumped to → OHT → and released to → piped supply

	or directly from borehole → pumped to → stand posts
<ul style="list-style-type: none"> • Taps can be turned off 	<ul style="list-style-type: none"> • Public taps cannot be turned off during times of water supply (no valves)
<ul style="list-style-type: none"> • Officially no water contamination in the area 	<ul style="list-style-type: none"> • Fluoride exceeds nationally permitted limits (twice- twenty times, depending on the water point) in the Kalaburagi district • Hard water (TDS exceeds limits) in most of the parts of the Kalaburagi district • High arsenic content found in water of some parts of the Kalaburagi district

4.2.1 Water Facilities and Supply in V1

The area of V1 relies on ponds and large open wells near them for its piped water supply. Other water facilities which can be found in this area are public and private open wells, hand pumps and rivers from which people either fetch water for domestic use or pump water to their sprinkler systems for agricultural irrigation purposes. V1 has the following water facilities:

Table 7 Water Facilities in V1

Type of Water Point	Number of Water Points	Private/Public
Hand pump	1	Public
Open well	10	5 public, 4 private, 1 on private premises but for shared use (not functional)
Tap	9	8 public, 1 private (supply via GLR)
Borehole	1	Private (for agricultural irrigation)
River	1	Public; used for agricultural irrigation and for domestic purposes by families without private connection when they cannot obtain water from other sources

The village consists in total of 14 houses and 51 inhabitants. It includes five hamlets. The local guest household's (H1) hamlet consists of three houses which accommodate nine inhabitants in total. The water for the piped supply of the village and one village next to it is obtained through a large hand dug open well near a pond. From this well the water is pumped to a ground level reservoir (GLR), using an electric pump. The water is pumped to the tank once every two days, stored in the GLR, and released to the attached pipe network for one hour per day with the water flowing downhill using gravitational force. V1's inhabitants were either farmers or farm workers who work on a day-work basis. H1 and H3 had their own farms, however, in all three households, family members were working on other farmers' farms too. The village consisted of an exclusively Hindu community. Each hamlet in the area comprised of four to five houses with one to six household members.

V1's population obtain their water mainly through open wells (mainly private, a few public) or taps (both public and private). The public hand pump is rarely used,

due to the high iron content in its water. Most of the private wells have electric pumps with which the water is pumped to overhead tanks and released to the taps in the houses or alternatively to a tap stand post outside the house, on the respective household's premises. Installation costs for a private tap connection are 1500 INR (\approx 21€). Private boreholes can only be drilled after the permission has been given by the government. For the construction of private open wells, no building permission has to be sought. The same is the case for private pipe connections to villagers' premises. The villagers have to pay for their installation and for the water obtained from these connections (water tax), and every private connection has to be authorised by the GP. Private piped connections are constructed by government engineers.

The oldest two wells in the village are public open wells which were built more than twenty years ago. In the past the inhabitants travelled to one of the two rivers near the village to fetch water and carry it home since the water from the public open well was not sufficient for the entire village. Consequently, the village community demanded more water facilities from the local government (Gram Panchayat). The government built the public hand pump and one more public well. These water sources were still not sufficient and the inhabitants still had to fetch water from the river during summer time. At the same time, farmers started installing pumps to extract water from the river for irrigation purposes of their nearby farms. This led to the river being dried up in summertime. Therefore, the community had to demand more water facilities again. The government responded to this by installing more public tap stand posts. Most piped stand posts are between two and five years old. Most of the wells in the area do not run dry in summer anymore or only for a short time, whereas the local river dries up completely. One well in the village is half funded by the government and half by the household next to it, the owner having promised to make the well available for other neighbours as well, as soon as it can be used. He never finished building the well due to a lack of money and the well therefore still remains half-constructed. There is only one private borehole in the village that has been drilled for private use for irrigation purposes. Wastewater from the local households is often used for irrigation of farm land. There are private open wells in the village

as well, some on private farm land, used for irrigation and watering of cattle, and others on private premises.

Although most periods of the year are abundant with rain in V1, rainwater harvesting is only practised by a few locals. In SC and ST wards, which are situated nearby V1, all houses are equipped with rooftop rainwater harvesting tanks, funded by the government. However, NGO members stated that these tanks would not be used and that the local population would generally not be in favour of domestic rainwater use due to them believing it to be the cause of colds and flu.

4.2.2 Water Treatment in V1

There is a general attitude in V1 that the water of the region is clean and free from contamination. Despite this, the most common water treatment measure taken by locals in V1 is the use of clay candle filter units, which are available in different sizes. Many locals do not treat their water at all. The water supplied by the government is not treated. Bleaching powder is added to public wells and tanks, in order to clean them several times per year.



**Figure 9 Clay candle filter
unit V1 (outside)**



**Figure 10 Clay candle filter
unit V1 (inside)**

4.2.3 Water Facilities and Supply in V2

V2 has - according to a site map from 2010 – the following water facilities:

Table 8 Water Facilities in V2

Type of Water Point	Number of Water Points	Private/Public
Hand pump	-	-
Open well	Unknown	3 public, unknown number of private open wells
Tap	Unknown	5 public stand posts, unknown number of private tap connections
Borehole	6	Government owned, used for piped water supply (for this purpose 3 OHTs, 5 mini water scheme tanks)

Given the fact that V2 is situated in a semi-arid area with very limited surface water available and mostly low groundwater levels, the water supply for the piped supply in V2 is ensured through six drilled boreholes which are located around the village area. Water is normally pumped to the village area and its overhead tanks (OHTs) for twelve hours per day. In some areas of the village and especially in the Scheduled Caste wards, water is directly pumped from boreholes through the pipe network to the public tap stand posts. Some of the villagers collect water from under the leaking overground pipes with metal bowls and codas. Codas are plastic or metal vessels used for water collection and storage.



Figure 11 Codas being filled at public tap V1



Figure 12 Water collection from leaking pipe

Water is also obtained from open wells in cases of failures in the supply or for other purposes than drinking. Clothes are washed by women on a daily basis with open well water next to the open well.

The population is mainly Hindu, however, around 25% of the villager's population belong to Muslim communities. In some wards of the village, different religious communities are segregated whilst in other wards they are mixed. However, there are two wards for Scheduled Caste and Scheduled Tribe which are segregated and secluded from the rest of the village's communities. The number of Christians who live in the area of V2 is unknown.

In V2, water is mainly obtained through either shared public open taps where people have to queue to collect water and then carry it home, empty their vessels and return to collect more water until the supply stops, or through private taps which are also shared with family, friends and neighbours. The water for this supply is pumped from boreholes. Costs for a private tap connection are 3000 INR (\approx 42€), for pipe material and the permission to lay a private connection. This connection has to be installed by the household members themselves. Farmers in V2 rely only on rainfall for irrigation purposes.

Asking locals in V2 which water supply they would mainly use, they replied:

"We use only tap water for drinking, if not supplied we use water from the well. But that water is not good to drink." (FG2)

"If we don't get tap water we use open well water." (FG2)

"We all use only tap water for drinking." (FG2)

By 'tap water' the interviewees could be referring to water collected from their own taps in front of their houses, public stand posts or from leaking inlet water pipes.

4.2.4 Water Treatment in V2

Located in the centre of V2, a Reverse Osmosis (RO) filter station, built in 2012, is run by a private company. Filtered water can be bought from this station for 4 INR (\approx 0.05 €) per twenty litres. Most of the villagers stated they did not like the taste of the RO treated water and that it would also be too much effort for them

to transport it from the village centre to their houses. The household members also saw no need for purchasing water from a filter unit. The majority of the households filter their drinking and cooking water with sieves which they perceived to be sufficient as water treatment. These sieves can be obtained at the weekly local market at the price of around 30 INR (≈ 0.40 €).

4.2.5 Differences in Piped Supply in V1 and V2

Public stand posts were not the same design in both areas. In contrast to plastic stand posts in V1, the ones in V2 were of a T-shaped metal construction without valves to close them, so that the water would be running continuously as soon as the supply started. Another form of public stand posts in V2 were short metal stumps in the ground, to which people attached a hose to fill bottles from.



Figure 13 Public tap in V1



Figure 14 Public tap in V2



**Figure 15 Water supply stump in
V2**

All these different supplies confront their users with problems such as water wastage and the possibility of bacterial contamination. Bacterial contamination became an additional concern especially in V2, since the inlet pipes from the boreholes to the overhead tanks were mostly overground and at many points leading through the open sewer of the village.

4.2.6 The Local Watermen

The Waterman is appointed by the Gram Panchayat as a permanent position. The Waterman is paid 800 INR (\approx 11€) per month.

The Waterman is mainly responsible for pumping the water - in the case of V1 - from the big drilled open well to the GLR and for supplying the community with water for one hour per day. Other general tasks of all Watermen are: informing the Gram Panchayat about failures in the water supply and network, voicing water complaints of the residents in his area as well as cleaning the water tank (two parts of calcium, one part of bleaching powder, readily mixed by the GP and handed to the Waterman) every six months and also for collecting the water tax. V2 has several Watermen responsible for the different wards. The Waterman responsible for the ward of H4, coordinates the activities of all other Watermen in the village. The Watermen in V2 had the same tasks as the Waterman in V1, apart from collecting the monthly water tax. This was done by the GP's Bill Collector.

“The Watermen come to open the valves and we tell them. They go to the Gram Panchayat and inform them. This way we go to the Waterman, and inform him about the problem, then he goes to the Gram Panchayat to inform them.” (H4)

4.2.7 Water Consumption in Households

The drinking-water consumption is difficult to measure, since there are often visitors coming to the households on a regular basis, especially during the stay of the researcher. The number of household members can also differ over certain periods as school children in particular, attending schools further away from their homes, might move to relatives or friends who live closer to their schools temporarily. On average participants stated they would drink four to five litres of water per day, given the warm climate and the physical labour they engage in.

4.2.8 Washing-Up and Laundry Washing Practices

Residents who live far away from open wells wash their laundry and dishes usually by hand either in the bathing corner of the kitchen, in their bath room - if they have a separate one - or in their garden. Laundry is only washed on the day when water is supplied in V2. In V1, laundry is washed every day or every second day. Residents in V2 who live within walking distance of an open well take their laundry to the next open well and wash it next to the well and then let it dry at the same location - if there is enough space to stretch their clothes on the ground or over bushes. Otherwise they take them back home again and hang them out on a line on their premises. Households in V1 wash their clothes with the water they are either supplied with at home or which they have collected and taken home. Laundry washing in both villages is carried out by women.

4.2.9 Back Gardens

Everyone in both villages who has enough space has a backyard garden where plants are cultivated and often dishes are being cleaned. Tap water is used (from public and private taps) for watering plants, despite the fact that using public water for irrigation is illegal.

4.2.10 Water Collection

The water collection in V1 and V2 is carried out by those available in the households at the times of supply. Household members who lack the physical ability to collect or carry the water vessels only help with the water collection if there is no other person in the household available. Hence, regardless of age or gender, the person who is available at the times of water supply collects water for the household. In V1 all household members have been witnessed being responsible for the water collection from all types of water points. In V2 the majority of household members collecting water from open wells and carrying it home were men. The villagers explained this as being necessary due to the long

walking distances between the wells and their houses. For water for activities e.g. laundry washing near the wells, women were mainly the ones manually pulling up water in codas which had ropes attached to them.

4.2.11 Open Defecation

In V1, every household had their own toilets and open defecation is not common practice. However, in V2 it is much more common; when asked for their drinking water situation, interviewees would tend to emphasize that sanitation is a larger problem in their area and that they would prefer to talk about this issue rather than about their issues with water supplies. The local government as well as the local community leaders and community members estimate that only around 25% of the village inhabitants have access to toilets. Remains of open defecation were visible, especially in the morning time in the streets.

4.3 Socio-Cultural Aspects of Water Supply Preferences

In this chapter and its sub-sections, the outcome regarding the socio-cultural factors for the villagers' preferences concerning their water supply and treatment are presented.

4.3.1 Access to Water Points

The different castes lived relatively segregated in both villages, and people divided themselves into different habitations (areas) of the village themselves. In some cases in V2, villagers lived relatively homogenously within the entire village. However, Scheduled Caste (SC) and Scheduled Tribe (ST) communities were excluded from the other village wards and from the water points belonging to these. Members of other castes did not want to be surrounded by SC and ST caste members and remarked that they felt uncomfortable sojourning at their wards or near them.

“No, I would not allow SC or ST to collect water from our tap. If they could not get it elsewhere, I would maybe put it for them. If there is an emergency. But I wouldn’t allow them to take water themselves or to touch it.” (H4)

“I have no interest in them (SC and ST) and their arguments. They work for me. I don’t speak with them.” (H3)

Only FG1 - mainly including women without any contact to SC and ST - stated the following:

“Traditionally, only for menstrual, they won’t be allowed to fetch water or even to use plates and prepare food. This is only the case for Hindus and Muslims. These people won’t go and collect well water. They won’t remove the water. People pour water for their vessel, then later they (the menstruating persons) will use it. They have to ask someone. It has come from, traditions. If the person touches anything, it will be unpure. Other than that there is no caste discrimination. Anyone can come and collect water. Before it was there. The people who make slippers, SC, ST, 50-60 years back when some of those women here were younger, they were not allowed to use the same water as others. This has changed now. Anyone can use the wells.” (FG1)

The subject of ‘impurity’ was especially raised outside the interview situation by H2. The interviewee representative of this household tried to explain why she would like to have her own water supply which cannot be touched by other people. These other people who might touch the same water source, especially open wells, might be impure and therefore she would not want to share the same water source with them. Especially for main Hindu festivals, several participants mentioned the importance of being able to having access to a pure water source in order to worship Gods in V1. As explained by the research assistant in V1, being pure is associated with being close to God. In both villages, private water points would generally be shared with other villagers, which the owner of the water points knew and liked. Permission for the collection at private water points was given by the owner, after his/her own household members had collected sufficient water for their own use.

4.3.2 Reasons for Preferences or Rejection of Certain Water Supplies

It was notable that all households' favourite water supply in V1 was open wells, regardless of whether they presently used an open well or not. The main reason for this preference was the availability of water independent from time constraints from this type of supply which was consequently perceived as reliable supply. Hand pumps were preferred over piped supply for the same reason despite the fact that they could not be used in both villages. In V2, piped supply was favoured over the use of open wells, as the latter were associated with minor water quality. However, in V2, positive attitudes towards hand pumps were also found although they were not being used by any of the questioned villagers here either.

This sub-section is presented in subdivided themes, as indicated by the correspondent italicised headlines and in these, the following reasons given by interviewees for their preferred source of water are presented in detail:

Foreseeable Reliability

A secure feeling of being able to see that there is water left in the well for the next day was named as the most relevant reason for the preferred choice of open wells in V1. 'Seeing is believing' was voiced by several participants and other Indians met during the research and presented by them as a local concept of judgment and verification. They further explained that the piped supply was unreliable and inhabitants could not be assured that there will be water coming out of the taps every day.

"For taps, water will not always come. You turn it on, and one day, there is water and the next day, there is no water. With our open well, this has never been a problem." (H1)

"As for hand pumps, there will always be water. But the quality is bad. Otherwise we would prefer the hand pump". (H1)

“Hand pump is good. It is easy to draw water. You don’t need strength. It is reliable. But we don’t have hand pumps here anymore.” (H5)

H1, H4 and H5 gave hand pumps as their either first or second favourite type of water supply, despite hand pumps not being accessible or functional in their village area (V2) or the water from the existing hand pump in case of V1 being of no sufficient quality to the locals. H3 named rainwater harvesting as their favourite source of drinking. H2 named open wells as their preferred source of water at any time of the year.

Spiritual and Religious Reasons

Two of the three households interviewed in V1 underlined the spiritual importance of open wells as one of the reasons wells were their preferred source of water, choosing from the supplies available to them. H1 underlined its spiritual value in Hindu tradition in general. H2 claimed that an open well would be needed for the celebration of the main Hindu festivals, particularly for the celebration of Diwali/Deepavali. During this festival, the worshipping of open wells would be compulsory in the region, according to the majority of participants in V1.

“We too keep a pot full of water only for worshipping God. Every time we keep it reserved only for worshipping God. Drinking water is also kept separately for washing and cleaning and in emergencies to drink, water is kept aside. We do not put bleaching powder in this coda. After performing our prayers, we can drink this water too.” (H4)

“Without water we (all beings on earth) can’t live. Even the animals, plants, all are, all is dependent on water. We are giving importance for water as a God. For us water is as important as a God.” (FG1)

“That is their (Hindu’s) culture because at every home, wells should be there.” (FG1)

“We call it (river) our mother. As a Brahmin (highest caste within the former Indian caste system), we have to go to the river Ganga (river Ganges) at least once in

our life. Collect or buy Ganga water in a copper vessel there, and take it home with us. When we die, it will be poured into our mouth. This is only for Brahmins.” (H3).

These statements show the spiritual importance of water for the Hindu communities among the participants, as well as for the Muslim household (H4) in a similar fashion. One household in V2, encountered during the village walk, described how other villagers were using their private open well, also to perform religious rituals, which the household members themselves described as ‘white’ and ‘black magic’. During these practices, fruits, covered in spices and colour and spiked with needles, had been thrown in their well by others in order to free themselves of sins, or to wish others bad luck, dependant on the individual ritual. Consequently, the house owner and his family stopped allowing others to use their private open well, as they regarded these acts to contaminate the well water and to kill the turtles living in it.

In every house the researcher visited in both study regions as well as in Bangalore, in Christian, Muslim and Hindu households, there were shrines for worshipping Gods set up in different fashions. Some families had their own room for worshipping with a shrine inside. Water would always be one of the elements in the shrine. It would be used to be sprinkled on figures of religious icons or used to wash them. The same figures were also placed inside bowls or other small vessels, filled with fresh water. The water in these vessels and bowls would be replaced as often as possible. In many of the households in V2, in the Kalaburagi district for instance, a separate coda was filled with water and only used for washing figures of religious icons and for drinking during or after performing prayers and worshipping (= ‘pooja’). These codas were kept on or near the shrine.

“We keep one coda with water purely for the purpose of worshipping in the prayer room next to the shrine. Only after praying, it is allowed to drink from it.” (H5)

“We too keep a pot full of water only for worshipping God. Every time we keep it reserved only for worshipping God. Drinking water is also kept separately, for washing and cleaning and in emergencies to drink water is kept aside. (...) We

do not put bleaching powder in this coda. After performing our prayers, we can drink this water too.” (H4)

In V1, the concept of Vaastu was specifically significant to most of the villagers, regarding the architecture of their houses, including the arrangement of the interior of their houses and the place for the well and OHT. One of the families met during the village walk had just moved the entrance of their house to another part of the house. They reported that after a series of events, which they described as ‘bad luck’, a spiritual leader of the temple they go to for praying and worshipping had suggested to arrange the house following Vaastu guidelines. This should improve the energy flow within their home and improve their well-being and the harmony with the world around them, and consequently improve their success in life. H1, H2, H3 and H4 - all Hindu households - mentioned that the guidelines of Vaastu would be important to them. H1 and H3 in particular said that it would be of importance to have their water point at a specific location on their compound to maintain this architectural order.

Habits and Traditions

One of the reasons for the use of open wells in V1 has to do with the fact that open wells have been the source of water for the locals for generations. Surface water was stated as the preferred raw source of water, especially in the past. However, interviewees reported that nowadays, surface water would be too polluted to be consumed directly. Therefore, the use of wells near ponds and rivers was preferred as these would be the closest to surface water supply, filtered by the soil. In this context, H1 and H3 referred to the great variety of medical plants in the area, which would be adding to the quality of the water when it seeps through the soil of this area. This fact was stated as knowledge transferred by old inscriptions and the interviewees’ ancestors.

“There are medical plants in this area. They have medical effects. When the water goes through the earth where they are, it has the same qualities too.” (H1)

„They use, they like, and they all are prefer well water. They're saying traditionally it has come, well water. If they cannot get well water, they use, nowadays, they use tap water. Or bore well water.“ (FG1)

Ease of Use

As one of the most important reasons for or against the choice of a certain water supply, the convenience was named by all interviewees. ‘Ease of operation’ or ‘ease of use’ refers to the effort a person has to summon up to obtain water. This effort includes mainly physical effort by pulling water up a well, operating a hand pump or walking long distances to reach a water point. Another important condition was that water can be obtained by household members at any time. Hence, the process of water collection would not interfere with their working hours or force them to collect water only during certain hours, which tends to mean that as many household members as possible collect water when it is available, regardless of how much water the household might actually need.

“For ease of use tap water is ok. I get cramps on my belly from drawing water from the well by hand”. (H5)

“Hand pump is good. It is easy to draw water. You don’t need strength. It is reliable. But we don’t have hand pumps here anymore.” (H5)

“From hand pump water is available all the time. Whenever you need it. If the quality (water quality) would be better, we would prefer hand pumps here.” (H1)

Water Quality

The water quality of the supplied water was seen as secondary to all households, except for H4 and H5. However, all of them believed that the water they are drinking is of good quality in the region where they live. Some only stated that a ‘good’ or ‘sweet’ taste of the water would be important to them, which would always be the case for open well water. Only in the case of the hand pump in V1 people complained about the high and noticeable iron content and did not to use

the hand pump at all for this reason. In V2, they were more aware of the chance that the water quality would not meet their expectations. Interestingly, H5, which was the Muslim household, mentioned the function of water as cleansing for body, house and objects as a first association at the start of the first interview.

“We are getting fresh water from the tap now. Water from the well as we are not using now, is dirty, if used daily it would be fresh. That is why we do not use it (open wells) anymore.” (H4)

“But for the quality I prefer well water or water from a hand pump. If the water was supplied regularly, it would be different. But this way, there is always water remaining in the pipe and ‘Nas’ (moss) will grow. And people stand in the wells with their feet when they fetch water.” (H5)

4.3.3 Complaints About Water Quality

The local Gram Panchayat and Zilla Panchayat officials in both villages reported that the only water-related complaints they have received were regarding water scarcity in summer, failures in the pipe network, unpaid water taxes of their neighbours or the turbidity of the water during monsoon seasons. This aligns with the responses of the individuals interviewed regarding this matter.

“People will complain to the Waterman and will report to us when there are problems with the water supply. There are problems in summer only.” (GP2)

“Often people will come directly (to the Gram Panchayat), like the man you just have seen. He complaint about his neighbours. He (the neighbour) has not paid his water tax. And so he doesn’t want to either. That’s what he told.” (GP1)

The last statement above presents an example for the close social bonds which are omnipresent in both villages, as well as the level of social control.

4.3.4 Own Provisions by Villagers in Cases of Dissatisfaction with Their Water Supply

It has been reported by all interviewed households and the local government that unknown persons keep on repeatedly breaking the over ground pipes in V2. Locals claimed these unknown persons would be breaking pipes by throwing large and heavy stones on them, which results in them bursting. These incidents would occur during night-time and none of the interviewees knew exactly who the 'pipe breakers' were, but all of the interviewees were convinced that these incidents would be an act of preventing others from obtaining water because the 'pipe breakers' would (temporarily) not have access to water or functional water points in their parts of the village themselves.

In V1, valves of the underground pipes, which only the waterman is supposed to touch in order to direct water towards each house for the same amount of time, are being changed, adjusted and also broken off to avoid re-adjustment by others. The villagers involved reported that they would otherwise not be able to obtain sufficient water or even water at all.

"Sometimes, at night, people break pipes. They throw big stones on the pipes to break them. They don't get water themselves where they live. That's why they do it. (...) No, I don't know who they are." (H4)

"We turn the valves ourselves when we cannot get water. Yes, the pipes are underground. You can still touch them. Then the neighbour comes and changes it again. I broke of the top of the valve. Me and my neighbour don't speak to each other. The engineer came, from the Zilla Panchayat. Nothing changed. Now we have a well." (H1)

"The water man starts and stops the water supply how he wants. We go to our neighbour to collect water from his tap. We don't get water when he (the Waterman) supplies the others. We are too far downhill. There is no water coming to us. The neighbour has changed the valve, now he gets water." (H2)

The interviewed person in H4, who is an important community leader and as such a person of high status in her community, has guided a protest march to the local

Gram Panchayat in the past. The protestors were carrying empty codas as a symbol for not having been supplied with water for more than two weeks, to demonstrate their unhappiness with the current situation.

“We are not happy with the work the Gram Panchayat is doing. Once in a year they wash the tank. Once in eight days they supply water. People don't get enough water. We were not happy with the government.” (H4)

4.3.5 Water Supply and the Government

This sub-section is presented by subdivided themes, as indicated by the correspondent italicised headlines.

Trust in Government Work

Many of the household members interviewed claimed that they were not happy with the water-related work of their government. In V1, H3 had a general distrust in the work of politicians. The other two households, however, believed in the government (local, on state and national level) and its politicians. These two households reported that their politicians have mostly responded to the need for new water facilities in the area but not to problems with failures in the communal tap water supply.

“They (Gram Panchayat) built taps and wells when needed. They have always responded.” (H1)

“We have told them so many times. They do not listen. Nothing changed. (...) I have trust in the work of the government.” (H2)

“We do not trust them. They are politicians. They are corrupt. How can you believe them?” (H3)

All households in V1 and V2 stated that they had no knowledge about government policies regarding hygiene programmes around the issue of drinking water or regarding water in general.

Gender and Political Leadership

During the field visit to V2 in Kalaburagi district, an unrecorded interview was conducted with a person who was introduced to the researcher as an ex-president of the village's Gram Panchayat. During the interview, however, the interviewee admitted that his mother used to be the elected Gram Panchayat president but that it would be common that the political decisions and the daily political business would be taken care of by a male member of the family instead, usually the female president's husband or father.

The Problem of Corruption and Water Infrastructure

The interviewees who were or had been involved in work for NGOs reported frequent collusive behaviour between contractors building new infrastructure – including water infrastructure – and politicians. These would often result in delays in the building of these infrastructures consequently leading to, significantly higher prices than the displayed costs in the original tenders. Surpluses created through this technique would be secretly shared between politicians and contractors. Similarly, the same interviewees reported cases in which infrastructure only existed on paper. Owners would still receive funds for the maintenance of these fictional infrastructures. In some cases, fearing that the non-existence of certain infrastructures could be noticed, another document would be issued stating its demolition. In other cases, infrastructures would exist but in a different way than stated in documents. The interviewee NGO1 for instance explained a case where a borehole had been drilled less deep than documented. Afterwards, a pipe network was laid on the basis of the existing documents resulting in the failure of the system to supply water.

“You cannot trust any data you see here in India” (NGO1)

“You just sign yourself with your left hand. That’s very common.” (NGO1)

“These things happen. Sometimes the infrastructure you will see on paper does not exist. Contractor will delay work. Projects will always escalate (in terms of how much time and money is required to complete them).” (NGO2)

4.3.6 Local Waterfinders

In both study villages, Waterfinders could be identified. In V2, the Waterfinder lived on his own, and was seen as a spiritual entity. The Waterfinder in V2 uses coconuts to identify underground water sources, as well as one two Rupee coin tucked in between two one Rupee coins. The two Rupee coin would start spinning in between the two one Indian Rupee coins when placed over a groundwater source. The Waterfinder in V1 uses coconuts, gold chains or iron rods to perform his tasks. He is not seen as a spiritual entity but rather as ‘skilled’. In V1, the Waterfinder’s services are not only sought by private individuals but also by the Gram Panchayat. This is not the case in V2. The Waterfinder in V1 reported that some of his clients had wanted him to search specifically for a groundwater source within the part of their compound which is intended for water in Vaastu.

„Some persons know how to find places to dig wells. These persons who know where the places are where it makes sense to dig wells, they would know this from experience and are members of the community. They give suggestions where you can dig wells, so the water will be there. Bore wells they dig or wells they dig, and find the right place for it this way.“ (FG1)

4.4 Economic Aspects of Water Supply Preferences in V1 and V2

In the following two sub-sections of this chapter, the economic aspects of the water supply preferences in both villages, as extracted from the data of the fieldwork, are presented.

4.4.1 Water Tariffs

Households having their own private open wells on their premises do not have to pay for the water they use. The same is the case of inhabitants using public open wells. Especially in V1, those who could afford their own open well, would favour this option of water supply. In V1, the use of public taps is taxed and the tax is collected by the Waterman on the 10th of every month. Households having their own private tap connections on their premises pay 1500 INR ($\approx 21\text{€}$) once to have the pipe connection laid. The water tax in V1 is 15 INR ($\approx 0.21\text{€}$) per month for the households using public taps and 30 INR ($\approx 0.42\text{€}$) for the ones having their own private tap connection. However, some households in the area have never been asked to pay water tax and consequently obtain the water they use for free.

“They (the Gram Panchayat) never came to ask me. They never said I have to pay.” (H2)

The majority of the interviewees, especially in V2, do not know how much they pay for their water. It is usually the men in the households with private connections who pay the bills. Usually, water and land tax are paid together yearly. Therefore, most people only have knowledge of the total amount they are paying but not about the precise amount of water tax which is included in this total amount. The bill is either paid at locals' houses when the Bill Collector comes to name the amount or at the Gram Panchayat building. If the amount is paid to the Bill Collector directly, no receipt is usually given. The amount to be paid for the permission to lay a pipe connection and the material for the connection in V2, adds up to a sum, which varies between 2000 and 3000 INR ($\approx 26 - 39\text{€}$), depending on the length of material required. For the use of public connections, no water tax is paid. Nevertheless, most households which can afford to, opt for their private connection, as they otherwise have to queue at the public stand posts and carry their water over longer distances. Hence, a private connection allows for them to collect larger amounts of water during the supply with less physical effort.

4.4.2 Economic Impact of Irregular Supplies and Potential Waterborne Diseases

All households mentioned that the loss of time and the dependency of their work schedule on the time frames of water supply is a major issue for their workforce. They would have to reject offers for day work if the work hours would overlap with the time of water supply. At the same time, villagers in V2 in particular voiced their concerns about their water quality and mentioned joint pain to be among the common impairments to health, during conversations throughout the village walk. This would cause them to spend significant amounts of money for medication, as well as result in a loss of salaries through increasing non-productive times due to illnesses.

4.5 Socio-Cultural Aspects of Water Treatment Preferences

In this chapter, the aspects of water treatment preferences that were observed are presented in a themed and ordered structure.

4.5.1 Water Contamination

The concept of 'Seeing is believing' is in place when it comes to the aspects and perception of water contamination, in a similar way as it is described regarding its importance for the perception of the reliability of water supplies earlier in this chapter. If locals cannot see any objects in their water, they assume it is clean and safe to consume. Amongst the visible objects or particles which are concerning for them, inhabitants of both study villages had seen in their water in past, they exclusively mentioned natural components (e.g. algae, larvae, moss).

In the case of V1, many of the farmers and especially H3 were aware of cases in the area where pesticides had been dropped from airplanes over vast farm land. In these areas, new born babies who are now adults as well as some of the older generations are suffering from diseases, deformed body parts and physical as well as mental disabilities. Locals have mentioned these cases during

observation and informal conversation, and stated that consequently they fear 'unnatural' substances and chemicals which have contact with their water and food. This includes chemical forms of water treatment as well. In V2, concerns of this kind were not mentioned by any of the participants.

"Tap water is storage water. We cannot see the tank where it is stored. There might be leaves or dead animals inside. It would be better to have our own open well, so we can look inside and see if it is clean." (H2)

"No chemicals we use to clean the tank (private OHT). Only water. All natural. Bleaching powder? We don't want chemicals in our water." (H1)

This fear demonstrates the power of information from sources and persons, the villagers believe in.

4.5.2 Waterborne Diseases

Many signs that could point towards fluorosis have been witnessed in V2. These lead from common joint pain, over 'bow legs', to pigment disorders such as white spots on lips, around the mouth and around joints.

Another local village in the Kalaburagi district was visited where a high arsenic content in the drinking water was evident (the village is located near an iron ore quarry) with many of the locals suffering from different types of cancer, and above all, skin cancer (black spots and warts, amputated limbs). The residents in the village were a traditional tribal community. The former Deputy Secretary of the local government (Gram Panchayat) had aimed to relocate the entire village to a location with better water quality. He could not implement his plan as he was replaced during the new legislation period. This was the reason given that the community still remained in the same location. Alternative action was taken by setting up an RO unit, which is run by a private company. However, most of the villagers cannot afford to purchase filtered water from this unit. Consequently, they mostly still consume the unfiltered water from the local water points. NGO2 claimed it remains unclear whether the local villagers wanted to be relocated from

their side. The NGO members explained that the village's population is strongly bound to the village region since their ancestors built the village's temples. Hence, the community would still believe they might abandon their Gods by leaving their current location.

In V1 and V2, all villagers asked stated that cases of diarrhoea are common during monsoon periods. Flu and colds during these periods are also believed to be caused by drinking water and are therefore part of waterborne diseases for all households, except for H3. An expert, working in India's rural water sector, emphasised that this belief would also lead to the perception of rainwater causing illnesses when consumed or used for bathing. Rainwater or even water in general would be associated with illnesses like cold and flu, as these illnesses increasingly occur during monsoon periods, along with waterborne diseases too.

4.5.3 POU Water Treatment and Filtration Methods

There were two key reasons for the use of privately purchased filters in V1. The first reason is the perception of a water filter as a symbol of wealth and which locals have seen their neighbours or other households using. Those filters are ceramic candle filter units which cost a total of around 150 INR ($\approx 2\text{€}$). The candle filter itself costs around 75 INR ($\approx 1\text{€}$) and can be obtained in many shops – especially shops selling cutlery - in the next bigger towns and cities. As reported by the locals, these types of filters and its parts only have to be replaced when they are broken. The other key reason for the use of these filters is the mud content due to soil erosion in monsoon seasons. Although H1 and H3 regard their water as being safe for consumption without treatment, they use these types of filter units at home. One explanation mentioned by H1 for this behaviour was that the household members use the filter unit as a habit. They had used these filters at home when they were still fetching water from the river. In surrounding villages, some people boil their water before drinking it instead of using water filters. In general, interviewees reported that they would mainly follow the advice of doctors and boil or filter their water exclusively for the unwell, as well as for visiting guests. All interviewees in V1 (households, NGOs and political leaders) referred to the

unique drinking water quality in their area. By saying this, they all mentioned the saying: 'Tunga pana, Ganga snana' which is found in Hindu inscriptions. It translates to: 'drink from the Tunga river, bath in the Ganges river'.

„Usually we are drinking open well water. This will be pure. So there is no filter. Directly the water comes. Even in the bore well also. If the water is good, there is no filter facility. Directly the water comes. Even if the water is not good, if something happens, if an animal died in the water, like that, something happens, they (government employees) empty the water from well, they clean it. So, like that they do. Other than that, there is no filtering with public facilities here.“ (H1)

“We will filter water when people like you come. Guests, visitors. They are not used to the water as it is here. And when the water is muddy in rainy season. Then we use the filter too.“ (H1)

“Our neighbour had one (a filter), so you want one too, isn't it? It is the same when you see your neighbour's two-wheeler (motorbike).“ (H1)

“Tunga water is the purest water. Very good quality. Very clean. Tunga pana, Ganga snana.” (H2)

Charcoal, UV and RO filter units are common in the urban areas of the Kalaburagi district. Nearly every restaurant has a RO filter unit, which has been visibly installed inside the customer's area. All the managers and owners explained that the customers would ask for it when they could not see the RO unit and most customers would refuse to eat at a restaurant without any proof of water filtration. However, none of the restaurant staff at any of the visited restaurants knew how RO filtration functions. They claimed to have seen the same filters being used at other restaurants they had been to themselves and viewed RO as the only effective, common and popular water treatment available.

In contrast to V1, hardly anyone filtered or treated their water in V2. The only 'filters' used were strainers and saree pieces or other cloths. A saree is a traditional Indian dress for women, consisting of a short blouse and a long veil which is wrapped around the body. Sarees are usually made of either cotton, silk, synthetics or a mix of these fabrics. In H5, the grandmother used her saree to

cover her drinking cup and then drink from it. She stated that she had learnt this practice from her mother, when she was young and tapeworms were prevalent in her village. This practice, over the time, had developed to be a habit, as she explained. H4 added an estimated amount of bleaching powder to their water, except for the water in the water vessel used for worshipping.

“Once in three months, maybe, I use it (bleaching powder) at home. I bring bleaching powder and use it. I put it in all water, except for the pot we use for worshipping. I use it when water is dirty or when I see bacteria, I use it. When water looks dirty. Once in two or three days. When I see germs in the water. They move in the water; they look like larva. When we see such things we use bleaching powder and then they die. Then for about 3-4 days we can use the water. For drinking water, I use very little of the bleaching powder. I get it from the Gram Panchayat. They don’t give it to everyone. I get it once in six months for free. If you take 2kg it will last for 6 months and if we put and rub it on floors they shine. Normally, they (the Gram Panchayat) don’t give it to you, even if you ask. Only people they know get it. They had been sprinkling it on a drainage four or five years ago. Then I asked why were they doing this? They said that it cleans the dirty drainage. I asked where it was available. They said at the Gram Panchayat. Then I told my husband about it. Then he told me he would get me some. That’s how it started. After using bleaching powder, the water looks clean.”
(H4)

“We always have to go to public open wells. For all the festival. Especially for worshipping during Deepavali. We don’t know who has touched the well. It might be unpure! Still, we have to go there and worship. I am very sad we don’t have our own open well.” (H2)

In V2, the only POU water treatment tools known which were available for purchase were kitchen sieves which were sold at the local market. H5 used these sieves as well as the majority of villagers encountered during the initial village walk. One woman of the village’s Muslim community, who was witnessed while using one sieve, explained that she is too poor to purchase any other filtration tools. When asked which ones she would purchase if she was wealthier, she said

that she had no knowledge about any other type of filters which could be bought and would therefore probably still buy a sieve. The sieves were commonly believed to clean the water from any type of water contamination.

4.6 Economic Factors Regarding Water Treatment

Some of the villagers, especially in V2 stated that they could not afford water treatment options, purified water from a filter unit or bottled water. However, when asking the villagers which treatment methods they would choose if they had more money, all of them stated that they were not familiar with any treatment options other than the ones currently being used in their area. Since the awareness of the existence of waterborne diseases or contamination of their water was not given for the majority of the participants, the need for treatment options was very low. In this respect, economic factors appeared to be of very minor importance to all participants of both villages.

4.7 Brief Summary of Findings

The following table presents a summary of the main findings, as presented in the results chapter and its sub-sections. It serves the purpose to help the reader to follow the thoughts and conclusion of the final chapters of this thesis more easily.

Table 9 Summary of Key Findings

<ul style="list-style-type: none"> • Main occupation of inhabitants lies within the agricultural sector
<ul style="list-style-type: none"> • High level of social control and social bonds within communities and villages
<ul style="list-style-type: none"> • People revert back from piped supply for reliable supply either temporary or totally
<ul style="list-style-type: none"> • Water supply problems in both regions in summer rather than at any other time of the year (April-June)
<ul style="list-style-type: none"> • Problems with water quality mainly during monsoon period (July-October)
<ul style="list-style-type: none"> • Water is being used for religious purposes (especially wells)
<ul style="list-style-type: none"> • Quality of water is estimated by taste and colour of water
<ul style="list-style-type: none"> • No awareness of, or knowledge about waterborne diseases
<ul style="list-style-type: none"> • Locals are not keen on collecting rainwater
<ul style="list-style-type: none"> • People choose between different supplies when there is a choice
<p>→ Important factors:</p> <ul style="list-style-type: none"> - Reliability - Ease of use - Personal perception of water quality - Religion and traditions
<ul style="list-style-type: none"> • Seeing is believing' (water quality, reliability of water supply)
<ul style="list-style-type: none"> • Lack of participation leads to: <ul style="list-style-type: none"> - 'Water diversion wars' - Private filter arrangements (strainers, candle filters, bleaching powder)

5 Discussion

In this chapter of the thesis, the results will be discussed, taking the objectives of the research and the findings from the literature review into account.

The aim of this research, as already presented in 1.3, is to identify the water supply and water treatment options chosen by the local rural population in the two study villages in rural Karnataka, and their reasons and motifs. Hence, detecting the socio-cultural and economic factors which are important for their choices was crucial for this research. In order to achieve this, the living conditions and daily routines related to drinking water had to be understood and the meaning of water for the targeted communities reconstructed. This helped to understand preferences and to unveil the reasons for the rural population's choices regarding their water supply and treatment.

5.1 Relevance of Choices Between Different Options

First of all, the water situation in the studied villages seems to have an influence on the villagers' choices of water supplies. The water situation includes the realities related to the quantity and quality of the water inhabitants are able to obtain, and the types of water supplies and treatments available. When it comes to the quantity of the available water, significant differences between seasons were noticed. During periods of drought, the water supply as well as the electricity supply declined. During monsoon periods, the water quality decreased and the cases of bacterial waterborne diseases, such as diarrhoea, increased. The turbidity rose and the population consequently felt an increased need to use filtration methods compared to other seasons of the year. These findings correspond with the findings of the WHO and UNICEF concerning their estimations of waterborne disease in India, especially during monsoon periods (1.1). In V2, the villagers were facing larger problems than V1's population with the quantity of water available. V2's population had therefore fewer options regarding the choice of their water supplies. Hence, their statements implied that, due to their problems with obtaining water in first place, the quality of water was

of secondary importance to them. This is particularly interesting as V2 is part of an area with significant water contamination problems, as presented in Table 6 in chapter 4.2. One reason for this might involve the lack of knowledge among the local population regarding water contamination, which evolved as the central aspect of this research and which is described separately in more detail in subsection 5.6. Failures in the pipe network, however, affected the water supply in terms of the quantity available to the locals in both villages. In V1, there were hints that these were linked to missing or inadequately designed infrastructure, as well as to limited resources for maintenance, which are problems found in the literature too and mentioned in the introduction of the thesis. Specifically, the problems mentioned here by Narsiah and Ahmed (2012), referring to the neo-liberalisation of the political system in India, in form of public-private partnerships which can bear the risk of corruption through money-oriented interest when new water infrastructure is built relate to the findings of this research. This adds to the already difficult situation found by the World Bank (2008a and 2008b) concerning poor performance of the concurrent water schemes in rural Indian environments. The problem here is also the limited decisive power held by the GPs and the rural population. Their lack of involvement is likely to facilitate chances for undetected corruption in connection with their infrastructure. Further elaboration on this aspect of the results is given in 5.4 and 5.5.

5.2 Temporary Water Supply Leading to Propensity of Hoarding and Wastage of Water

Piped water is generally only provided temporarily, which often leads to water wastage as the villagers collect more water than they need until the next supply. A sense of fear and uncertainty is given regarding the amount of water which will be supplied and which the household will be able to collect. Even villagers like H1 who own their own private well - which never dries up throughout the year - always keep an 'emergency coda' with water stored in their kitchen, since they are used to irregular supply from their piped supplies in the past. Unutilised water is thrown away after two days in V1 and after two to four days in V2. Aside from

H1, all households just throw their surplus water away unused. H1 uses it to water their plants. Overall, H1 had a good knowledge on environmental issues as the father of the household was part of a sustainable farmer's organisation. This is one of the aspects which show the connection between the quantity of the available water and the tendency for water wastage. It also hints at the connection of knowledge and water supply, treatment and handling of water in general. The fear shown by the villagers could be linked to their comments on their choices of water supply which is mainly influenced by one of their main criteria for this choice: the foreseeable reliability of their water points. This hints at the desire to have one reliable water point which can be used throughout the whole year, irrespective of drought or monsoon. Hand pumps are amongst the favoured supplies of the villagers, despite them not being used by the villagers. Another explanation for this could be that the villagers were obviously only able to choose between water supply options they knew. Seeing hand pumps, no matter if functioning or not, within their village area, leads to the conclusion that the villagers know what hand pumps are, how they are operated and some of the villagers have even used them in the past. The lack of knowledge regarding drinking water will be separately elaborated on in the sub-section 5.6.

5.3 'Storage Water' and the Concept of Impurity

With the temporary water supply and the limited electricity supply, the need for storage of water in GLR and OHT or in storage vessels at the villagers' homes also arises. Many of the villagers mentioned their concerns about what they called 'storage water', referring to the water stored in GLR and OHT for the piped supply. However, the perception of well water is that it is fresh water in V1. In V2, public well water was regarded as being contaminated and of limited quality. In both cases, the concerns mentioned for this were similar on closer inspection. They were always related to the concern that 'others' could contaminate the water. In the case of GLR and OHT, the rural population was concerned that objects contaminating the water could reach the interior of the tank or that the tank would not be cleaned regularly and thoroughly enough. In all cases including public

open wells especially, the fear of the wells being contaminated by certain persons, (by entering the wells with their bare feet, throwing objects into them or simply touching them) presented a major concern. From their points of view, the interviewees revealed that this seems to be linked to the former caste system and the persistent perception of certain lower caste members being 'impure' and accused them of contaminating water and objects by simply touching them. A similar image of women during their menstruation was found. During this period, women are not allowed to go to temples. Some villagers who are Muslims or Hindus would not allow them to pour water, cook themselves or use the same cutlery used by others in the household too. This concept of impurity seemed to be deeply rooted in the rural social life through traditions and religion. Religion was a very important aspect of the daily lives of all villagers encountered throughout this study, whether the participants were Hindus, Muslims or Christians. This became obvious especially through the exclusion of the lower castes, which belong to the 'backward' declared classes or castes. Generally, the different religious groups mostly lived segregated in homogenous groups. This was the case for groups of the same religion, which were again divided into different sub-groups and sub-castes. These groups followed different practices and diets which were described as either religion-specific or particular caste specific in the case of Hindus. These different lifestyles manifested themselves in a very small-spatial concentration and purview. Villagers would refer to these circumstances, noting that culture in India would change entirely every fifty kilometres. These spatial cultural differences can be explained by the restricted mobility of the population which limits itself to movements within a small area for most of the rural population. Hence, social bonds within families and communities are strong. Within these communities, a hierarchical order was observed in daily interactions. There are hints in the literature referring to the specific group of Dalits - which are part of the backward castes - and their status within society (Johns, 2012), presented in 2.1.3 of the literature review. During the fieldwork of this study however, the general issue of persons of lower status, amongst castes of generally similar social status who depend on the good will of persons of higher social status, has been witnessed. The breaking of pipes by unknown persons in

V2 could be a desperate act of these groups of people with lower social status, to draw attention to their water situation.

5.4 Top-Down Hierarchies in Water Decisions and Own Provisions of Villagers

A similar hierarchy as found in general social structures became increasingly obvious in institutional organisations, e.g. the government institutions, within their different levels of administration. This is reflected in the top-down fashion in which decisions regarding village water supply are made, despite the existence of local rural governments, as described by the World Bank (2008b). The statements of the interviewees concerning their local government, which at first seem contradictory, might reflect these hierarchies. Many interviewees stated their unhappiness about the water-related work or the overall effort of the government. However, almost all of the interviewees, except for the only household consisting of members with a high level of education, high income, and high social status (H3), said they would trust the government and did not question their authority. This lack of participation is mentioned by the World Bank (2008a, b), along with the problem of centralised water supply solutions as a major factor for inefficiency of water supplies.

Despite the social and institutional hierarchies and a lack of chance to participate in decision-making processes related to water supplies, the villagers counteracted by making their own provisions. Examples for this include the construction of private water infrastructure, such as open wells and the adjustment of water diversion valves for the piped supply. Another option implies using the water points of neighbours when water cannot be attained from other publicly available water points. This option, however, leads to a dependence on the owner of the water point and relies on the willingness of the owner to share his/her water point. When it comes to water treatment, provisions consist of the private purchase of filters, sieves or bleaching powder. Private investments had to be made by the villagers, in order to acquire an upgrade of the personal water facilities to improve their quantity and quality, by means of water points and

treatment. Privately funded solutions are not affordable for all villagers. Micro-loans were taken by H1 and H2 to be able to afford a private open well in the case of H1 and a private tap connection for H2. However, none of the villagers mentioned costs for water as a burden or significant issue. This is problematic, as most studies focus on the economic factors, namely on the willingness to pay and the costs for operation and maintenance of water infrastructure (and treatment). The fear shown by the villagers could be linked to their comments on their choices of water supply, which is mainly influenced by one of their main criteria for this choice: the foreseeable reliability of their water points. This hints at the desire to have one reliable water point which can be used throughout the whole year, irrespective of drought or monsoon. Hand pumps are amongst the favoured supplies of the villagers, despite the fact that they do not use these facilities. Another explanation for this could be that the villagers were obviously only able to choose between water supply options they knew. Seeing hand pumps - functioning or not - within their village area leads to the conclusion that the villagers know what hand pumps are, how they are operated and that these hand pumps might even have been used by the same interviewees in the past. This finding needs further attention by researchers in the future. In the context of water supply and treatment the role of low income and poverty should of course not be neglected. The rural population should be provided an affordable access to safe and sufficient water. Potentially, currently low costs for water – if there are costs for the villagers for water at all – might have led to economic factors not being mentioned by the participants even though they were free to talk about their preferences in the context of drinking water and about their current water situation. Nevertheless, in summary, the participants' choices for the preferred water supply and treatment were rather influenced by the foreseeable reliability of the water point, ideally throughout the year, its accordance with the daily religious, habitual and traditional practices as well as the physical ease of obtaining water.

5.5 Challenges for Water Supply and Water Management

Corruption and a lack of adequate infrastructures and maintenance, leading to dysfunctional water supplies or missing infrastructure which existed on paper, were witnessed as challenges for the rural population's supply with water. A key problematic here, which was mentioned by both NGOs of this research sample as well as found in the literature and mentioned in the introduction (Narsiah and Ahmed, 2012), is the public private partnerships between government and private constructors. Missing infrastructure can pose a long-term problem, if based on assumptions of its actual existence further water infrastructure is planned. This might actually be one reason - apart from the focus on a supply driven approach when planning and constructing water infrastructure - for the existence as well as malfunctioning of several over-layering water schemes, as bemoaned by Conin et al. (2014), the World Bank (2008a, b) or Arghyam (2009). Another aspect which might put the water supply at risk by aggravating the depletion of groundwater levels can be the use of Waterfinders. Waterfinders do not assess the available quantity of groundwater while performing their search for shallow groundwater sources. Hence, the use of Waterfinders cannot be seen as a sustainable measure for the already over-exploited Indian groundwater levels. Adequate and well planned water management is important for sustaining water supply in water-rich areas as well as in drought prone and arid regions. Groundwater recharge is being done using check dams in the outskirts of V2 and in neighbouring areas of V1. There was no hint to a connection between the use of Waterfinders or dowsing in general and water management or sustainability.

5.6 The Central Problem of the Lack of Knowledge About Water Supply and Treatment

The lack of knowledge about water supplies and water treatment options was found to be the key aspect in this research. As described for most of the world's population in the literature review of this thesis (2.2.1), the same lack of knowledge about water supplies and treatment, including a lack of understanding of their technical functioning, was experienced in all areas visited in Karnataka.

The existing knowledge about certain water supplies and treatment in rural India was found to be solely based on former personal experiences and passed on knowledge from family members and the close social environment. In the case of V1 this led to a rejection of chemical treatment by most citizens due to incidents involving the spread of diseases which had been caused by the use of chemical fertilisers in other villages of the same district in the past. These concerns regarding chemical treatment were not found in V2. Similarly, the relationship between rainwater, flu and colds seem to have led to a negative perception and consequent rejection of rainwater as a potential water source in rural communities. NGO interviewees and experts working in the rural water sector pointed out the importance of this reason for the rejection of rainwater beyond the scope of V1 and V2. An increase in the significance of rainwater harvesting could be another element for sustainable water use and management of water. The findings of this study regarding the option of rainwater harvesting as a supply and its acceptance as such are contrary to most statements in the literature (Barthwal et al., 2014; Ward et al, 2013; Hartung, 1999). Following these, end-users normally view rainwater as a clean alternative. Only experts in the water sector are concerned about potential bacterial contamination of drinking water obtained through rooftop rainwater harvesting.

In regards to water treatment, choosing to purchase sieves matches the perception of water contamination as being generally visible, considering the sieves used are only able to filter visible matter and objects from the water. Subsequently, the concept of 'Seeing is believing' was true in the context of water treatment too. As mentioned in the literature review, water is generally judged regarding characteristics which are perceptible by the human senses. This perception resembles the presentation of the social acceptance and perception of drinking water supply in India, as set out in 2.2.1 of the literature review (Banda et al, 2007; WHO, 2011).

Another seemingly simple but very important aspect for the villager's choices regarding their water supply and treatment is not only the availability of different water supply and treatment options (Nauges and Whittington, 2010), but also the

knowledge and education amongst the rural population about these. If the villagers lack the knowledge about different alternatives of water supply and treatment, their only choice is to adjust to the supplies and treatment options that are being introduced to them through their installation for these supplies by, for example the government or NGOs. If the villagers possessed information about drinking water, they would start weighing the different options according to their needs. The earlier mentioned strong social bonds which were experienced, usually lead to detailed transfer of information and knowledge within the particular communities. Local community members of high social status can be described as community leaders as they hold the power to educate their community. The lack of knowledge about the existence of waterborne diseases was independent of status, income and education levels of rural communities as also described by Peter-Varbanets et al. (2009). This lack of knowledge regarding water supply and treatment might also lead to a reliance on the government, despite the unhappiness about the quality of the government's work. During the village walk and the interviews in V1, the locals possessing a larger knowledge about the technical aspects of their water supply infrastructure complained that many of their neighbours would rely primarily on the government and hence expect them to solve their problems without them attempting to educate themselves. These attitudes regarding the government's responsibility might stem from the legally determined public right to clean and sufficient water too, as presented in 1.2 of the introduction (DoDWS, 2010).

5.7 Gender and Water

Gender aspects, as mentioned in literature (2.3.2), were witnessed in the allocation of house work, but not towards water collection, as Conin et al. (2014) describe in their article, which was carried out by both genders equally. Usually and in poor areas especially, women and men were working outside the house as well. This presents a significant difference to the general findings of the literature on this topic, which largely describes women and girls being the vast majority responsible for water collection.

5.8 Vaastu and Water

The concept of Vaastu and its importance for the construction of private houses and the location of objects and persons within the house – including water sources and infrastructure – was witnessed during the fieldwork for the first time. There is literature on Vaastu available concerning its importance for Indian architecture and the spiritual well-being of living creatures (2.3.3; Chakrabarti, 1998; Quack, 2011). A connection to water projects or the consideration of its potential importance for everyday life and as such incorporated in decisions and practices of the rural Hindu population, however, does not seem to have been made yet.

6 Limitations, Conclusion and Recommendations

In this chapter, the limitations of the research are presented first (6.1). This is followed by the conclusion, which will address the research questions and give recommendations for further research.

6.1 Limitations of the Research

Despite the small sample and the approach to the field using qualitative methods, similarities and consequent patterns were found during the research. The careful and precise sampling of participants, the consistency in using the same interview script for all household interviews as well as the same interview script for the NGO members and political leader interviews, helped with cross-checking of the data obtained in the field and validation of the resulting findings. At the same time, openness of the research could be maintained. However, certain difficulties and limitations for the study occurred and will be explained in the following, in order to put the study and its findings into perspective. Presenting them also offers insightful information for those planning to conduct research in a similar way or on a similar topic.

The researcher constantly focussed on maintaining her attitude of openness in the field, in order to immerse herself as much as possible into the life-world of the participants. As mentioned in the methodology chapter, bias was reduced here by the awareness of the visibly different geographical and cultural background of the researcher through constant reflection of the latter on her actions. Additionally, the researcher was remaining rather passive and mindful during the research. However, her sheer presence and different appearance might have evoked different reactions and acting of individuals in the field, as opposed to a researcher conducting this study and being a local person of different gender, age and appearance. In this context, the researcher is also aware of the demonstration-effect, her presence in the field might have caused in participants' behaviour. She considered this by drawing careful conclusions from the findings of the study. The same effect was also minimised through participant observation

of which living as close as possible with participants of the study was an essential component. Most interviewees seemed to be unfamiliar with the process of interviews, especially whilst being asked open questions. The majority of the rural private population had to be repeatedly assured that there were neither 'right' nor 'wrong' answers to the questions asked by the researcher and that their honest opinions and judgements were important. All participants became more comfortable with the interview situation throughout the course of the first interviews. During the following second phase interviews, the interviewees were perceived to be more open and relaxed from the beginning of the interviews which allowed for interviews that were very close to natural conversations. By spending as much time with the participants as possible and using a mixed-method approach, the researcher lowered the chances of overlooking ambivalent acting of participants e.g. actions contradicting the oral information given by them.

Working with translators poses the risk of bias as well. The researcher had to rely on the truth of the statements and translations voiced by the translators and also had to trust them regarding the communication of questions and responses during interviews and participant observation. To account for this, the translators were briefed and prepared in detail before the first interview and operations in the field. Throughout the fieldwork, every interview was discussed with the respective translator after the interviews had been conducted and after the researcher had reviewed them.

In regards to the sampling, backward castes, including SC and ST could not be in the particular focus of this research, as these groups hold a special status - also in legal terms - within the Indian society. Hence, conducting thorough research on their complex situation would have been a research project on its own. Therefore, for this research, the set of problems around these groups regarding their water supplies and treatment could only be included as marginal aspect. Besides, amongst the population of V1, there were no backward caste members. It is important to note - with reference to the sampling of the focus group discussion in V2 - that most of the villagers belonging to other former castes refused to attend discussions with members of backward castes. Since

the backward castes were not the focus of this study and due to the large number of the V2's inhabitants, the most heterogeneous mix possible within the women group for the group discussion, could only be achieved by following this wish voiced by the rest of the female community members. These circumstances themselves, however, provided an insight into the socio-cultural structures of the rural community and the still existing exclusion of former lower caste members. In terms of the sampling of the household interviews, many of the available Muslim families from which the researcher had to choose in V2 were too large in numbers (around 15 family members, of which up to seven were responsible for the water collection). Other households could not guarantee their availability due to their working status as day-labourers. An interview would have meant a day without payment for them, for which the researcher - following ethical research guidelines - could not have offered any financial compensation. Consequently, they could not be taken into consideration as participants, despite being otherwise suitable for the study from a scientific point of view.

Availability of data and figures of water supply, water treatment, water quality, population data and data in general was difficult to acquire in the field. When asked for numbers, some interviewees (including government officials), would name figures from their memory. Constant hints at the unreliability of data created in India were given by the majority of the participants, excluding the families from the household interviewees. Current socio-economic data on the population was usually declared as not available. A vast amount of data is documented by institutions but is not processed or merged following the collection process. These circumstances might have affected the quality of the numerical secondary data gathered in the field.

6.2 Conclusion and Recommendations

The research questions of this study are:

1. Why does the local population use the water supplies and treatment methods they use?
2. Which socio-cultural and economic factors influence the local population's perception regarding their water supplies and treatment methods?

First and foremost, the lack of knowledge and consequently education regarding water contamination, measures related to drinking water and water in general was found to be one of the major concerns for an informed choice of the villagers for their water supply and treatment. Since all villagers can only judge water supply and treatment methods which are within their boundaries of knowledge, they were found relying on the opinion and role model of the persons of trust in their social environment, whether these opinions were informed or not. The second factor which influenced their judgement was their personal experiences. This manifested itself for example in the belief that the use and consumption of rainwater would be unhealthy and consequently led to its rejection. Other examples include the lack of knowledge on the existence of waterborne diseases amongst the villages' populations. Views concerning the ideal and preferred water supply differed significantly among the different groups of participants. Whereas political leaders considered piped supply to be their preferred source of drinking water, households and villagers in general would mostly opt for the use of hand pumps or open wells. Piped water supply - for most of the household interviewees of this research project - was associated with unreliable water supply and uncertainty of its water quality. Political leaders seemed to be favouring water supplies which are uniformly applicable across several villages and regions in the same fashion. Households and local villagers, however, selected their preferred water supply following a combination of water availability and the ease of its access, measured in distance and physical effort, as well as by following cultural and social aspects which determined their daily routines.

NGO members made rather differentiated statements on water supplies and preferred solutions - which are individually fitted to different regions - by taking their particular situation concerning available water quantities and qualities into account. Hence, they argued for region-specific approaches to water problems, supply and treatment in general. Economic factors were found to be less important for the choice of water supply and treatment. This is important to note for future research, as economic factors are usually the focus of most studies researching social aspects and perceptions revolving around water technologies. Economic factors only mattered when they involved the ability to purchase treated water from filter units, building own water infrastructure for private water supply or as a loss of income as well as costs for medication through potential water quality-related health problems. In general, social inequality, affecting certain groups within society, including their access to sufficient and clean water, became obvious during this research. The groups and individuals significantly affected by this form of social exclusion were former lower Indian castes and persons of low social status. The actual decision-making processes in terms of rural water supply and treatment and the chance to participate in demands of an improvement in water quality and availability was found to be granted exclusively to influential community leaders of higher status. Others feared repressive measures by the leading government or the community. The same seems to be true for the choice in water supply and the dependence of villagers without functional water supply on other villagers with functional private supplies. Sympathy, status and good will play a key role for the owner in allowing others to use their private water supplies.

The tariff system, which does not cover the maintenance costs for water supplies and treatment, also brings in difficulties for the improvement and upholding of the functionality of water supplies. Nevertheless, it is important to note that raising the water costs would present a problem for the poor rural population's ability to pay for their water. With more education and mobilisation of the local population, however, rural communities could operate and maintain their own water supplies themselves to a certain extent and consequently reduce the long-term costs for these.

All in all, it can be said that, if there are no choices regarding water supply and treatment, the rural population adapts to the options available to them. On the contrary, if there are choices between different supplies and a provision with a sufficient quantity of water given, the rural population starts focussing more on the quality of their water. This, however, should not lead to a negligence of the quality of the supplied water for the satisfaction of the basic need to obtain water but both aspects should ideally be addressed equally and simultaneously. Furthermore, various water problems, related to the quantity and quality of water, occur in different seasons of the year. In finding a solution to this, the limited electricity supply - particularly in the summer months - has to be accounted for. Albeit their interdependence, problems with electricity and water supply are largely viewed separately. A solution to these seasonal differing problems could either be uniform (addressing all problematic aspects occurring throughout the year, in all rural areas) or individually fitted to the temporary but recurrent problems in each area. The latter would require a high degree of initiative and motivation from the rural governments' sides. However, locals are currently used to obtaining water from different sources throughout the year and mentioned the potential for a proactive approach from their side. In addition, a major downside of a uniform supply - which would likely have to be technologically advanced in order to address various forms of water contamination, different soil properties, as well as changing conditions in the availability of water source quantity (e.g. seasonal fluctuation in surface and ground water bodies) - would be its costs.

The current temporary limited water supply often leads to water wastage. This was found to be largely based on the uncertainty of the precise time or even date of the next water supply and the subsequent fear of being without water in between supplies which led to a collection of the maximum amount of water. Additionally, the concurrent socio-cultural reasons for the rejection and use of water supplies have to be taken into account. The realities of the villagers and their reasoning need to be regarded as the starting point for the education of the rural population, regardless of these realities being true or logical as they are both for the villagers and hence have to be accepted as valid definitions of their reality in this context. Examples for this are that the quality of water can be important to

them not only for general drinking purposes but also for spiritual and religious performances. Nevertheless, the information made available to the villagers should be based on factual rather than on anecdotal evidence in order for them to be able to make informed decisions. Ways to make water contamination - such as excess fluoride or arsenic - visible to the villagers and GPs could be a possibility to bring their attention to these problems. Most importantly in this context: outlining the potential effects of these contaminations and approaches whilst offering them options to tackle this problem at the same time. Hence, a basis for informed decisions could be created. This is applicable beyond the rural or Indian context. On a broader scale, the fact that local cultural practices were described as differing in every village leads the researcher into concluding that a region's - or village's - specific water supply and treatment could be more efficient than a uniform approach in the Indian context. However, the success of the improvement of water supplies and treatment is linked to the ambitions and potential power of self-assertion of each individual local government.

Following this, recommendations for stakeholders across the water sector, especially local government institutions and NGOs would therefore be to send employees to the individual villages or communities, in order to canvass local opinions to include these in the process of planning water programmes and schemes. Locals beliefs, habits and traditions influence the acceptance and use of water infrastructure and subsequently have a significant impact on the success of the implementation of new water technologies and policies. Particularly village walks, accompanied by locals, ideally community leaders, knowing the history of the current and previous water points and the problems around them, including their potential social implications and arguments about them amongst the local community, can give a quick inside on the on-site water situation in rural areas. This can be done asking the local community expert to guide the village walk, by showing the water points. Combining this village walk with making him/her or a group of locals draw a map of the existing water points in the community area, while asking him/her or them to explain the history of these water points allows for relatively detailed insights, gained within a very short time.

In summary, it can therefore be said that the socio-cultural factors in particular which turned out to be significant regarding the preferences and choices of water supply and treatment in rural India, have to be further investigated in order to be able to find adequate solutions for rural communities. A qualitative in-depth approach over a longer period appears to be desirable here. These factors are important to consider when planning and installing new water technology, in order for this technology to be adequately designed for the needs of the targeted population and as such accepted by them. Knowledge on new water supply and treatment facilities - to avoid water contamination and consequent disease outbreaks - in combination with community-based participation seems to be required to achieve educated judgements and recognitions of water supply and treatment technologies, as well as to empower the local population. Another recommendation for future research projects would be the collection of basic quantitative data on socio-economic population structures as well as numeric data on the functionality and availability of water points and water sources, as there is currently a lack of reliable information on these. This data would be helpful in order to gain an overview of the general water situation in the villages and for a survey of the water situation on-site.

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APPENDIX

Interview Script: Social and Economic Aspects of Water Supply in India

Targeted Interviewees:

- Local households (men, but also specifically women or 'employees' in household) in village
- NGOs, water suppliers/managers, government officials

Households/Residents:

Socio-economic background:

Name

Age

Gender

Household situation

(Caste/Tribe)

Occupation/how many hours at home per day

(Income/money at own disposal)

Questions:

Opening Question: What does water mean to you? (Associations with water)

Access to safe and affordable water sources (including storage)

Which water source?

- Source of water: Where do you get your water from (for all purposes in daily life, including drinking water)?

Since when? Which ones have you been using in the past? Which do you prefer?

Water source/point and 'Belonging'/ Who uses which water source/point?

- Who uses the same water source as you? Why?
- Are there people who are not allowed to use the same water source as you (constantly/temporarily)? Who is allowed to use the same water source as you, who is not (e.g. area restrictions, property restrictions, other restrictions/ rules)?

Availability of Water:

General:

- Availability of water: Are you facing problems obtaining potable/ drinking water? Which? What do you use (tap) water for? Do you buy bottled water? What do you use bottled water /tap water for?
- What do you use water for (e.g. livestock, irrigation, drinking purposes, washing, bathing, etc.)
Do you fetch the water for these different purposes from different sources/ water points?

Seasonal:

- Do you face temporary problems obtaining drinking water? (**Drought period <-> Monsoon/ rainy seasons**)
- Do you always obtain the water for your daily needs from the same water source(s)/point(s) during all seasons of the year?

Storage:

- How do you store your (drinking) water?
- Which are the reasons why you store, collect/ obtain water the way you do?

Water collection:

- Who is the person in your household that is responsible for collecting water/ providing the household with water?
Does this person have to travel to collect/ buy water?
If so, how far? In meters/ time? Would you say this too far way for you?
How often do you have to go to collect water (per day/week)?
- If you collect water: which meaning does the water collection process have for you? (Does it have any meaning at all?)
Are there aspects you would say are positive or negative about it? List your personal advantages and disadvantages of collection process the way you do it, please!

Water tariffs:

- How much money do you spend on water per month? How much do you pay for a litre?
How do you pay for your water (e.g. token, card, pay as you go, monthly)?
Have the prices for water changed in the past years? If so how (increase/decrease to what extend)?

Personal perceptions and opinions related to maintenance, water (access) and water quality:

Knowledge about policies and water treatment:

- Do you know of any policies related to water (supply) in your area/India?
- Do you know how the water you use is treated (filtration, chlorine, etc.)?

Trust/person of trust:

- Would you say you have faith and trust in the work the state does, water related/ in general?
- Who is the person you would contact in the event of problems you could not solve yourself and needed help or advice?
Who would you contact in case of problems with water supply and how would you contact them?

Personal hygiene measures and waterborne diseases:

- Are there signs of waterborne diseases in your social environment/ your neighbourhood/ your area?
- Are there routines maintaining hygiene and health that you have included in your daily life (e.g. washing hands (using soap), safe storage of water)?

Personal perception of water quality, overall water situation, tariffs and changes:

- Describe personal perception of quality of the water you are using (including taste, etc.)?
What would you consider to be safe drinking water? How do you decide that the water you drink/ use is safe or not? (e.g. taste, colour/ turbidity, appearance in general, data/ information/statistics provided by the government, someone in your village/ family told you --> who and why?, news, commercials)

Based on which information do you make choices of water supply in general?

- What is your perception of the overall water situation in India/ your local water situation? (Where do you see major issues, where strengths?) Explain. Describe.
- Have there been changes in price and quality of (potable) water in the past years/ or before?
If you think there are changes needed, please explain why. How could the current system be improved in your opinion and adjusted according to your requirements?

Personal preferences and ideals:

- In which way were you gaining potable/ drinking water so far (e.g. buying bottled water, drinking water from tab/ boiling tab water before drinking it, travelling to a shared tab)? Which way of obtaining potable water would you prefer if you were to choose? Why? Which ways/technologies have you used so far and which problems were you facing using these? (e.g. water kiosks, etc.)
- How far away from/ close to your home would the water point be ideally if you had to choose? Why?
- Would you rather prefer a traditional water source or a modern one? Why? Which ones would you think of for both cases exactly?
- Would you say that traditional water sources play an important role for the people in your area? Why? /Explain, please. What is your opinion on traditional water sources?

NGOs, water suppliers/managers/government officials, (local, district, state level), University staff, etc.

- Name
- Age
- Position
- Function
- Background of person and organisation

- **NGOs only:** Why do you/ your organisation do(es) the work you do (water related)?
Why do you think it is important?

Water source and water treatment:

- Where does the state of Karnataka/ the region take its water from (e.g. rivers, groundwater, rain water harvesting)?
- Which treatment technologies and steps are used for water treatment (including chemical treatment)?
- Are there any reservations towards certain filtration methods or sources used for water catchment, production or any lack of social acceptance towards the way water is supplied (e. g. certain tabs, sharing them with other people from other families/ethnicities/ (former) castes; method: filtration of wastewater, or any concerns for other social or religious reasons)?

Access to water for public and water quality:

- Which are the different ways for the public to access potable water in India/Karnataka/Aaraga, Thirthahalli, Shimoga/Gurmatkal, Gulbarga? Do you see problems here for certain groups (in certain, area, caste, etc.)? Which problems do you see regarding water access in the state/your area in general? Which problems do you see regarding the water quality in your area?
- Do you have the impression that the Indian public actively demands a higher water quality (including the aspect of the taste of the water)? Do people with unimproved water access demand improvement? (Are they able to?)
- Which, do you think, are the major water-related problems in your area?

Water supply and policies:

- How do the following factors influence the engagement in activities to improve water

supply schemes: caste/ ethnic background, social status, gender, age, income, traditions/ customs?

- What and who would you say is the main focus (e.g. gender, age, region) of water policies/ projects in India/ Karnataka/ your area? Why?
- How important is the aspect of (environmental) sustainability in water policies and decisions of private and public actors involved in the water sector in India/ your region?

Administrative organisation:

'Administration Chain':

- How does the 'administration chain' work in terms of decision - making and responsibility for water supply projects?

State funding of water projects:

- How does state funding of water projects usually work? Who receives money for what and how?

Public-private partnerships in water projects:

- What would you say, how good is the co-operation between actors/ stakeholders within water industry in India?
- What is your opinion on public-private partnerships within the water sector?

Tariffs:

- How does the public pay for their water?
- How much does the average person pay for a litre of water in India/Karnataka/..? How much is this compared to their per capita income?)

Person of trust and in charge (water related problems):

- What do people do if they have problems with their water (supply)? Who would they approach?

Traditional water sources:

- What do you think are the reasons for local people going back to traditional water sources?
- Which role do you think traditional water sources play in India/ your area?
Do you regard this as a good/ bad thing?

- Mention quote from newspaper
(following AAP success during elections in Delhi)

“[...] AAP, come and free the city of the corporator - engineer – contractor - land mafia
nexus”

What does this mean/refer to? Could you explain this to me?